This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

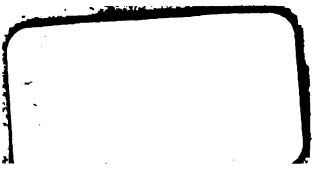
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

NYPL RESEARCH LIBRARIES
3 3433 06636843 6



T. PETTITT & CO.,

Architects', Surveyors' and Engineers'

LITHOGRAPHERS,

WHOLESALE STATIONERS, PRINTERS, &c.,

22 and 23 Frith St., and
50 Old Compton St., W. } SHAFTESBURY AVENUE,

LONDON, W.

BILLS OF QUANTITIES & SPECIFICATIONS

COPIED OR LITHOGRAPHED

With the utmost accuracy and despatch.

T. P. & Co., having many years' experience, and a special staff of writers thoroughly used to builders terms, Surveyors may rely on any work being forwarded to them being correctly executed.

BILLS FORWARDED BY POST FROM THE COUNTRY RECEIVE IMMEDIATE ATTENTION.

Reference to Surveyors in all parts of the Country.

TERMS:—Very advantageous terms, either subject to a *liberal discount* according to time of credit, or lowest net CASH price quoted.

Maps, Plans, Elevations, Working Drawings, Reports on Designs and Photo-lithography with expedition.

TELEPHONE NO. 3719.

SPON
3VEC

PORTLAND CEMEN'

H. F. CURRIE & C(

Offices—

ALBERT BUILDINGS, PREESON'S RO

Stores—

NOVA SCOTIA, CANNING DOCK,

LIVERPOOL.

Telegraphic Address: "QUALITY, LIVERPOOL." Telephone No. 18

London Portland Cement, Plaster of Paris, Gypsum, Lin Pavement, Bricks, Crushed Granite, Fire-Clay Goods, Slates, Whiting, China Clay, &c.

Double Lever Automatic Cement Testing Machines and Arnold' Patent Testing Plant.

SPECIAL FACILITIES FOR EXPORT ORDERS.

STANLEY BROS., LT

NUNEATON,

MANUFACTURERS OF

WHITE AND COLOURED ENAMELLED BRICK

SPECIAL BROWN GLAZED BRICKS, Various Shades

(Largely used for Hospitals, Schools, &c.),

SALT GLAZED BRICKS,

BROWN & CANE GLAZED SINK

RED AND BUFF CHIMNEY POTS,

Sanitary Pipes and Connections, Closet Pans and Traps, Blue Building, Paving and Stable Bricks, Coping, Kerbing and Channelling, Garden Tiles (Blue and Salt Glazed) Red, Blue and Buff Staffordshire Paving Tiles,

SUPERIOR RED, BUFF AND CHOCOLATE QUARRI

(Specially suitable for Churches, Entrance Halls, Conservatories, &c.),

RED, BROWN AND BLUE ROOFING AND RIDGE TILE

Ornamental Red Crestings and Finials, Red and Buff Ornamental Terra-cotta, Fire Bricks, Quarries and Lumps, Buff Bricks and Clinke Vases and Statuary. Ventilating Bricks and Malt Kiln Tiles.

Complete Illustrated Catalogue with Price List on applicatio

Ernest SPONS'

ARCHITECTS' AND BUILDERS' PRICE-BOOK

With Useful Memoranda and Tables

BY

W. YOUNG, ARCHITECT

AUTHOR OF
'PICTURESQUE ARCHITECTURAL STUDIES,' 'TOWN AND COUNTRY MANSIONS,' ETC.

TWENTY-THIRD EDITION

London:
E. & F. N. SPON, 125 STRAND

New York:
SPON & CHAMBERLAIN, 12 CORTLANDT STREET

1896

THE NEW YORK
PUBLIC LIBRARY
45600
ASTOR, LENOX AND
TILDEN FOUNDATIONS.

PREFACE TO THE TWENTY-THIRD EDITION.

THE continued increasing demand for this work gives the opportunity, in revising for another edition, to extend the Memoranda, and still further develop the original plan of the work, to make it an accurate and reliable, as well as convenient handbook. The arrangement of the matter in alphabetical sequence, thereby making it easy to turn up any desired formula or memorandum in a moment, has been adhered to as in former editions.

Considerable additional information has been added, and this edition includes a chapter on electricity, with complete specifications and estimates of electric lighting installations carried out by the author—lightning conductors, electric bells, &c.; also extra divisions on concrete, fireproof floors, and granite.

W. Y.

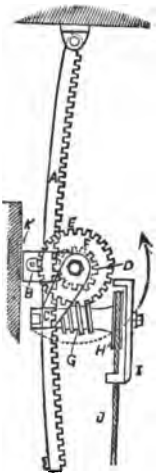
6 LANCASTER PLACE, STRAND, W.C.
January 1896.

The Author will be glad to receive any information or suggestions calculated to render this Book more useful.

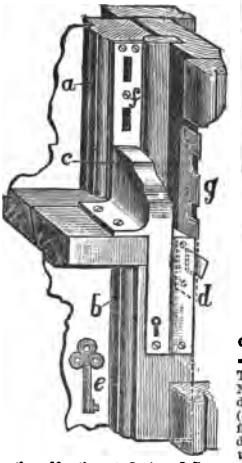
53 HIGHEST ROBERT ADAMS' AWARDS.

Patent Regulating and Self-sustaining Fanlight Openers, and other Ventilating Gear, Casement and Door Bolts, Fasteners, &c.

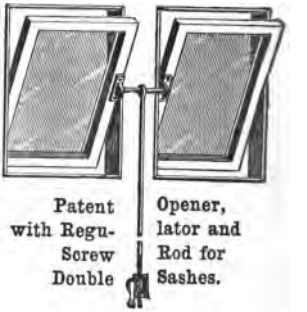
BEST AND LARGEST VARIETY.



Patent "Scott" Rack and Wheel Skylight Lifter.
Also for Fanlights, &c.



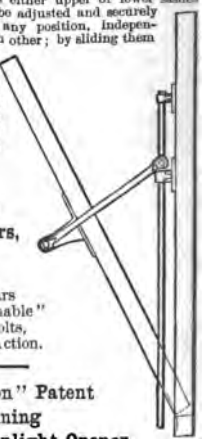
the self-acting studs (*c* and *d*) engage into their respective slots in the adjusting plates (*f* and *g*). The action of the key (*e*) releases both studs (*c* and *d*) simultaneously. Other patterns to suit lofty windows, with keyhole at bottom of lower sash *a* for fixing to surface or to manipulate by hand. Easy to fix and work, strong and simple. Invaluable for Asylums, &c.

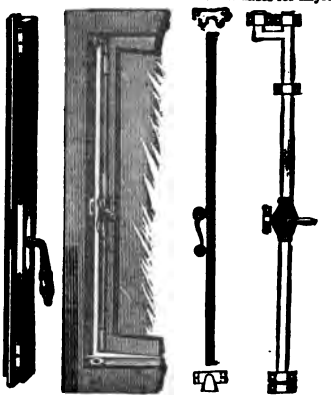


Patent Screw Regulator and Double Opener, with Rod for Sashes.

Suitable apparatus supplied for continuous lights of every description.

The "PROTECTOR."—Arthur W. Adams' New Patent Locking Catch for sliding windows enables either upper or lower sashes (*a* and *b*) to be adjusted and securely fastened in any position, independently of each other; by sliding them up or down.





The best and neatest Bolts for Casements, Doors, Gates, &c.

Write for particulars of the New "Impregnable" Patent Locking Bolts, with Secure Key Action.

The "Link Motion" Patent Self-sustaining and Regulating Fanlight Opener for General Purposes,
opening inwards or outwards.
Other Patterns to work with Cords, &c., as required.

BUILDING T[illegible] EMPORIUM,
67 NEWINGTO[illegible], LONDON, S.E.

INDEX TO ADVERTISEMENTS.

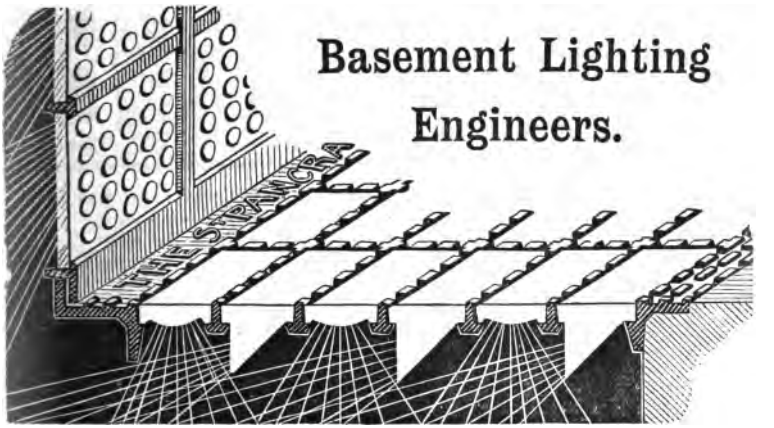
		PAGE
Adams, Robert	67 *Newington Causeway, S.E.*	i, xii, xvi
Anderson, D., & Son, Ltd.	*Lagan Felt & Rubber Works, Belfast, and* 812 *Old Ford Rd., E.*	lix, lx
Anderson, R., & Co.	101 *Leadenhall Street, E.C.* ..	lv
Atterton, Jno.	*Haverhill, Suffolk*	lxiv
Austin, Jas., & Sons	8 *and* 9 *Dysart Street, E.C.* ..	lxix
Barker, F., & Son	12 *Clerkenwell Road, E.C.* ..	lvii
Bath Stone Firms, Ltd. ..	*Bath*	xxi, xxii
Bickley, Joseph	62 *Lillie Road, West Brompton, S.W.*	ix
Blackman Ventilating Co., Limited	63 *Fore Street, E.C.*	xlvii
Carter & Co...	*Poole, Dorset*	lxv
Coalbrookdale Co., Ltd. ..	*Coalbrookdale, R.S.O., Shropshire*	lxiii
Colledge & Bridgen	*Midland Lock Works, Wolverhampton*	viii
Collyer, C., & Son	36 *Farringdon Street, E.C.* ..	xlix
Currie, H. F., & Co.	*Albert Buildings, Preeson's Row, Liverpool*	iii
Damman and Washer & Co.	72 *Finsbury Pavement, E.C.* ..	lxvi
Darbishire, W. A.	*Penn-yr-Orsedd Office, Penmaenmawr*	vi
Dorman, Long, & Co., Ltd.	*Middlesbrough, and* 19 *Victoria Street, S.W.*	v
Easton, Anderson & Goolden, Limited	3 *Whitehall Place, S.W.*	xlvi

		PAGE
Edison & Swan United Electric Light Co., Ltd.	*Ediswan Buildings, Queen Street, E.C.*	li, lii
Edwards, J. C.	*Ruabon, North Wales*	xxxii
Glover, Thos., & Co.	214 *to* 222 *St. John Street, E.C.*	xxxix
Gray, J. W., & Son	113 *Leadenhall Street, E.C.* ..	lvi
Hands, Alfred, & Co. ..	113 *Leadenhall Street, E.C.* ..	lvi
Harling, W. H.	47 *Finsbury Pavement, E.C.* ..	xlviii
Harrison, W. E.	*Steeple Jack Works, Sheffield* ..	lxvi
Hartley & Sugden, Ltd. ..	*Halifax*	xv
Hayward Bros. & Eckstein	*Union Street, Borough, S.E.*	xliii, xliv
Hayward-Tyler & Co. ..	*Ormond House*, 63 *Queen Victoria Street, E.C.*	l
Helliwell & Co., Ltd.	*Brighouse, Yorkshire; and* 9 *Victoria Street, S.W.*	lxvii
Hindley, E. S.	11 *Queen Victoria Street, E.C.* ..	liv
Hobbs, Hart & Co., Ltd.,	76 *Cheapside, E.C., and Arlington Street, Islington, N.*	xxviii
Hobman, A. C., & Co. ..	*Cliftonville, S. Bermondsey, S.E.*	xxiii
Jackson, George, & Sons ..	49 *Rathbone Place, Oxford St., W.*	xxxv
Jones, Frederick, & Co. ..	1A *Perren Street, Ryland Road, Kentish Town, N.W.*	xxxiv
Jones & Attwood	*Stourbridge, and* 35 *Old Queen Street, S.W.*	xiv
Kellow, Moses	*Park Slate Quarries, Penrhyndeudraeth, North Wales* ..	lxv
Le Grand & Sutcliff	*Magdala Works, Bunhill Row, E.C.*	lxii
Lincrusta-Walton (F. Walton & Co., Limited) ..	2 *Newman Street, W.*	ix
Longden & Co.	*Phœnix Works, Sheffield, and* 447 *Oxford Street, W.* ..	xxxviii
Macdonald, Alex. & Co., Ld.	373 *Euston Road, N.W.*	lxvi
Macfarlane, Walter & Co.	*Saracen Foundry, Glasgow* ..	iv

		PAGE
McNeill, F., & Co.	*Bunhill Row, E.C.*	xxv, xxix
Measures Brothers, Ltd. ..	57 *Southwark Street, S.E.* ..	xi
Meek, P. G., & Co.	44 *Blackfriars Road, S.E.* ..	lxviii
Mitchell, Inman, & Co. ..	40 *Cloth Fair, E.C.*	lxiv
Nelson, Chas., & Co., Ltd.	16 *South Wharf, Paddington, W.*	xvii
Nicholls & Clarke	*High Street, Shoreditch, E.* ..	x
Oakeley Slate Quarries Co., Limited	53 *Parliament Street, S.W.* ..	xxxi
Patent Victoria Stone Co., Limited	283A *Kingsland Road, N.E.* ..	xx
Pen-yr-Orsedd Slate Quarry Co., Ltd.	*Penmaenmawr, R.S.O.*	vi
Pettitt, T., & Co.	22 *and* 23 *Frith Street, and* 50 *Old Compton Street, Shaftesbury Avenue, W.*	ii
Pierce, Watts, & Co.	*Canada Dock, Liverpool*	lxiv
Plastic Decoration Co., Ltd.	21 *Wellington Street, Strand, W.C.*	xxxvi
Roberts, C. G.	*Haslemere, Surrey*	lxvi
St. Pancras Ironwork Co. ..	*St. Pancras Road, N.W.* ..	xiii, lxx
Siemens Bros. & Co., Ltd.	12 *Queen Anne's Gate, S.W.* ..	lxxi
Smith, Jonas, & Co.	*Belvedere Road, Lambeth, S.E.* ..	x
Smith, Powers & Co.	*Coventry, and* 84 *Leadenhall Street, E.C.*	xlvii
Soper, John	20 *Old Cavendish Street, W.* ..	lxii
Spon, E. & F. N.	125 *Strand, W.C.*	vi, x, xviii, xix, xxvi, xxxiii, xxxvii, xl, xlii, liii
Stanley Bros.	*Nuneaton*	iii
Stanley, W. F.	*Great Turnstile, High Holborn, W.C.*	lviii
Stuart's Granolithic Stone Co., Limited	*Regent's Dock, Limehouse, E.* ..	xxiv

		PAGE
Tann, John	*Newgate Street, E.C.*	lxi
Vivian, Hon. W. W.	*Port Dinorwic, Bangor, North Wales*	xxx
Walton, F., & Co., Ltd. ..	2 *Newman Street, Oxford St., W.*	ix
Waygood, R., & Co., Ltd.	*Falmouth Road, Great Dover Street, S.E.*	xlv
Willesden Paper & Canvas Works	*Willesden Junction, N.W.*	vii
Wood Block Flooring Co. (Geary's)	11 *Queen Victoria Street, E.C.* ..	xxvii
Woodward, James, & Rowley	*Swadlincote, near Burton-on-Trent*	lxii
Woollams, Wm., & Co. ..	110 *High Street, near Manchester Square, W.*	xli

THE ST. PANCRAS IRON-WORK CO.,



Patentees and Manufacturers of Improved

PAVEMENT LIGHTS.
TILED do.
FLOOR do.
STALL BOARD do.
CELLAR FLAPS, Patent Spring balanced.
Do. rolling, &c.
SELF-FASTENING COAL PLATES.

ILLUSTRATED PRICED CATALOGUE, WITH FULL PARTICULARS, SENT ON APPLICATION TO—

THE ST. PANCRAS IRON-WORKS,

ST. PANCRAS ROAD, LONDON, N.W.

TELEPHONE No. 7519.

Telegraphic Address:—
"EQUITATION, LONDON."
[To follow Index to Advertisements.

Telegrams: 'Heat,' Stourbridge. 'Hottest,' London. Medals: 1875 and 1881.

HEATING APPARATUS.

High Pressure, Low Pressure, or Steam, for every description of Building.

HEATING SPECIALITIES
Pipes. Boilers. Coils.
HOT WATER AND STEAM
Joints. Radiators. Valves &c.

EXPANSION JOINT PIPES.
SOCKET PIPES. FLANGED PIPES.
BOILERS WELDED AND RIVETED.
GRATINGS. RADIATORS.
PLUMBERS' GOODS.
HORTICULTURAL SUNDRIES.
TOOLS, VARIOUS.
VALVES FOR STEAM OR HOT WATER.
RAIN-WATER PIPES.
TUBES, WROUGHT IRON.

'RELIABLE' RADIATOR.

RADIATORS

IN VARIOUS DESIGNS.

ILLUSTRATED CATALOGUE FREE.

W. Jones's Treatise, 'Heating by Hot Water,' 220 pages, 96 Engravings. Cloth, 2s. 10d. free.

ESTIMATES
for Heating Apparatus or Hot Water Supply.

LONDON BRANCH:
35 Old Queen St., WESTMINSTER, S.W.

JONES & ATTWOOD
STOURBRIDGE

Works and Head Offices:
STOURBRIDGE

TRADE DIRECTORY.

Air Propellers.

Blackman Ventilating Co., Limited.

Aneroid Barometer Makers.

Barker, F., & Son.

Architectural Modellers.

Bickley, Joseph.
Jackson, George, & Son.
Plastic Decoration Co.

Art Metal Workers.

Adams, Robt.
Coalbrookdale Co., Ltd.
Macfarlane, Walter, & Co.

Artesian Well Engineers.

Le Grand & Sutcliff.

Artificial Stone.

Patent Victoria Stone Co., Limited.
Stuart's Granolithic Stone Co., Limited.

Baize.

Mitchell, Inman & Co.

Basement Light Engineers.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Baths and Bath Work.

Adams, Robt.
Coalbrookdale Co., Ltd.
Macfarlane, Walter, & Co.

Blinds.

Collyer, C., & Son.
Soper, John.

Blind Lines.

Austin, Jas., & Sons.

Boilers.

Adams, Robert.
Atterton, Jno.
Easton, Anderson & Goolden, Limited.
Hartley & Sugden, Ltd.
Hayward Bros. & Eckstein.
Hindley, E. S.
Jones & Attwood.

Books.

Spon, E. & F. N.

Boring Tools, Pumps, &c.

Le Grand & Sutcliff.

Brass Plate Engravers.

Barker, F., & Son.
Meek, P. G., & Co.

Builders' Brassfounders.

Adams, Robt.
Colledge & Bridgen.

Builders' Ironmongers.

Adams, Robt.
Colledge & Bridgen.

Casement Fittings.

Adams, Robt.
Colledge & Bridgen.

Cellar Fittings and Flaps.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Cement.

Currie, H. F., & Co.
Nelson, C., & Co.

Chimney-pieces (Iron).

Coalbrookdale Co., Ltd.

Closets, Valves, &c.

Adams, Robt.
Woodward, Jas., & Rowley.

Coal-hole Plates and Pavement Lights.

Adams, Robt.
Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Compass Makers.

Barker, F., & Son.

Concrete.

Stuart's Granolithic Stone Co., Limited.

Corrugated Ironwork.

St. Pancras Ironwork Co.

Cow-house Fittings.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Damp Course.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F., & Co.

Domestic Water Supply.

Easton, Anderson & Goolden, Limited.
Hayward-Tyler & Co.

Door Furniture.

Adams, Robt.
Colledge & Bridgen.

Door Springs.

Adams, Robt.
Colledge & Bridgen.

Doors—Iron and Steel.

Hayward Bros. & Eckstein.
Hobbs, Hart & Co., Ltd.
St. Pancras Ironwork Co.
Tann, John.

Drawing and Surveying Instruments.

Harling, W. H.
Stanley, W. F.

Electric Bells.

Harling, W. H.
Siemens Bros. & Co., Ltd.

Electric Light Engineers.

Easton, Anderson & Goolden, Limited.
Edison & Swan United Electric Light Co., Limited.
Hands, Alfred, & Co.
Hayward-Tyler & Co.
Siemens Bros. & Co., Ltd.
Waygood, R., & Co., Ltd.

Electrical Fittings.

Edison & Swan United Electric Light Co., Limited.

Elevators.

Easton, Anderson & Goolden, Limited.
Waygood, R., & Co., Ltd.

Encaustic Tiles.

Carter & Co.
Edwards, J. C.
Stanley Bros.

Engineers.

Adams, Robt.
Anderson, R., & Co.
Atterton, Jno.
Blackman Ventilating Co., Limited.
Coalbrookdale Co., Limited.
Colledge & Bridgen.
Dorman, Long, & Co., Ltd.
Easton, Anderson & Goolden, Limited.
Edison & Swan United Electric Light Co., Limited.
Glover, Thomas, & Co.
Hands, Alfred, & Co.
Hartley & Sugden, Ltd.
Hayward Bros. & Eckstein.
Hayward-Tyler & Co.
Hindley, E. S.
Hobbs, Hart & Co., Ltd.
Jones & Attwood.
Le Grand & Sutcliff.
Longden & Co.
Macfarlane, W., & Co.
Measures Brothers, Limited.
St. Pancras Ironwork Co.
Siemens Bros. & Co., Ltd.
Tann, John.
Waygood, R. & Co., Ltd.
Woodward, Jas., & Rowley.
Wright & Co.

Engravers.

Barker, F., & Son.
Meek, P. G., & Co.

Fanlight Openers.

Adams, Robt.
Colledge & Bridgen.

Felt Baize Cloth.

Mitchell, Inman & Co.

Felt, Foundation and Roofing.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F., & Co.

Fibrous Plaster Slabs.

Jackson, Geo., & Co.
Jones, F., & Co.
Plastic Decoration Co.

Fireproof Flooring.

Measures Brothers, Limited.
Stuart's Granolithic Stone Co., Limited.

Fireproof Lathing.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Fireproof Pugging.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F. & Co.

Fireproof Safes.

Hobbs, Hart & Co., Ltd.
Tann, John.

Fireproofing Contractors.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F., & Co.

Flax Lines.

Austin, Jas., & Sons.

Floor and Basement Lights.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Gas Appliances.

Glover, T., & Co.

Gates and Railings.

Coalbrookdale Co., Ltd.
Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Gas Meters.

Glover, Thomas, & Co.

Girders (Iron & Steel).

Dorman, Long, & Co., Ltd.
Measures Brothers, Limited.

Glass (Plate and Sheet).

Nicholls & Clarke.

Glaziers.

Nicholls & Clarke.

Granites and Marbles.

Ingram & Clarke.
Macdonald, Alex., & Co., Ld.

Granolithic Stone.

Stuart's Granolithic Stone Co., Limited.

Hat and Coat Hooks.

Adams, Robt.
Colledge & Bridgen.

Hinges.

Adams, Robt.
Colledge & Bridgen.

Hoists.

Adams, Robt.
Easton, Anderson & Goolden, Limited.
Waygood, R., & Co., Ltd.

Horticultural Builders.

St. Pancras Ironwork Co.

Hot-Air Engineers.

Hayward-Tyler, & Co.
Musgrave & Co., Ltd.

Hot-Water Apparatus.

Coalbrookdale Co., Ltd.
Hartley & Sugden, Ltd.
Hayward Bros. & Eckstein.
Jones & Attwood.
Longden & Co.
Macfarlane, Walter, & Co.

Hydraulic Engineers.

Coalbrookdale Co., Ltd.
Easton, Anderson & Goolden, Limited.
Le Grand and Sutcliff.
Waygood, R., & Co., Ltd.

Incandescent Lamp Makers.

Edison & Swan United Electric Light Co., Limited.

Inspection Covers.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Iron Bridges.

Dorman, Long, & Co., Ltd.
Macfarlane, Walter, & Co.
Measures Brothers, Limited.
St. Pancras Ironwork Co.

Iron Founders.

Coalbrookdale Co., Ltd.
Dorman, Long, & Co., Ltd.
Hayward Bros. & Eckstein.
Macfarlane, Walter, & Co.
Measures Brothers, Limited.
St. Pancras Ironwork Co.

Iron Joists and Girders.

Dorman, Long, & Co., Ltd.
Measures Brothers, Limited.
St. Pancras Ironwork Co.

Ironmongers and Brass Founders.

Adams, Robt.
Colledge & Bridgen.

Iron Sashes (Wrought and Cast).

Adams, Robert.
Hayward Bros. & Eckstein
St. Pancras Ironwork Co.

Iron Staircases.

Coalbrookdale Co., Ltd.
Hayward Bros. & Eckstein.
Macfarlane, Walter, & Co.
St. Pancras Ironwork Co.

Jib Cranes and Crabbs.

Atterton, Jno.

Joinery.

Damman & Washer & Co.
Smith, Jonas, & Co.

Lawn Mower Grinders.

Atterton, Jno.

Lathing Metal.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Letter Makers.

Meek, P. G., & Co.

Lifts and Hoists.

Adams, Robt.
Easton, Anderson & Goolden, Limited.
Waygood, R., & Co., Ltd.

Lightning Conductor Manufacturers.

Anderson, R., & Co.
Gray, J. W., & Son.
Hands, Alfred, & Co.

Lime, Cement, Bricks, &c.

Nelson, C., & Co.

Lincrusta-Walton.

Walton, Fredk., & Co., Ltd.

Lines (Blind and Halyard).

Austin, Jas., & Sons.

Lithographers.

Pettitt, T., & Co.

Locks.

Adams, Robt.
Colledge & Bridgen.
Hobbs, Hart & Co., Ltd.
Tann, John.

Marbles and Granites.

Macdonald, Alex., & Co., Ld.

Mathematical Instruments.

Barker, F., & Son.
Harling, W. H.
Stanley, W. F.

Metal Workers.

Adams, Robt.
Meek, P. G., & Co.

Mortise Locks.

Adams, Robt.
Colledge & Bridgen.
Hobbs, Hart & Co., Ltd.

Paper Hangings, &c.

Walton, Fredk., & Co., Ltd. (Lincrusta-Walton).
Willesden Paper & Canvas Co.
Woollams, Wm., & Co.

Parquetry.

Damman & Washer & Co.

Party-Wall Doors.

Hobbs, Hart & Co., Ltd.
Tann, John.

Pavement Light Engineers.

Hayward Bros. & Eckstein.
St. Pancras Ironwork Co.

Paving Construction.

Patent Victoria Stone Co., Limited.
Stuart's Granolithic Stone Co., Limited.

Plasterers.

Bickley, Joseph.
Jackson, George, & Sons.
Plastic Decoration Co.

Pumping Machinery.

Coalbrookdale Co., Ltd.
Easton, Anderson & Goolden, Limited.
Hayward-Tyler & Co.
Hindley, E. S.

Quarry Owners.

Bath Stone Firms, Ltd.
Dinorwic Slate Quarries, Director and General Manager, Hon. W. W. Vivian.
Macdonald, Alex., & Co., Ld.
Nelson, C., & Co.
Oakeley Slate Quarries Co., Limited.
Pen-yr-Orsedd Slate Quarry Co., Ltd.

Radiators.

Jones & Attwood.
Hartley & Sugden, Ltd.
Hayward Bros. & Eckstein.
Longden & Co.

Rain-Water Goods.

Coalbrookdale Co., Ltd.
Macfarlane, Walter, & Co.
Roberts, C. G.

Ranges.

Adams, Robt.
Coalbrookdale Co., Ltd.

Roofing Felt.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F., & Co.

Roofing Tiles.

Coalbrookdale Co., Ltd.

Safes—
Fire and Burglar-proof.

Hobbs, Hart & Co., Ltd.
Tann, John.

Sanitary Engineers.

Adams, Robt.
Woodward, Jas., & Rowley.

Sash Fittings.

Adams, Robt.
Colledge & Bridgen.

Sash Lines.

Austin, Jas., and Sons.

Silicate Cotton or Slag Wool.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F., & Co.

Slate.

See QUARRY.

Soundproofing Contractors.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F., & Co.

Soundproof Pugging.

Anderson, D., & Son, Ltd.
Jones, F., & Co.
McNeill, F., & Co.

Stable and Harness-Room Fittings.

Hayward Bros. & Eckstein.
Macfarlane, Walter, & Co.
St. Pancras Ironwork Co.

Staircases.

Hayward Bros. & Eckstein.
Macfarlane, Walter, & Co.
St. Pancras Ironwork Co.
Stuart's Granolithic Stone Co., Limited.

Steam Engines.

Coalbrookdale Co., Ltd.
Hayward-Tyler & Co.
Hindley, E. S.

Steam Pumps.

See PUMPING MACHINERY.

Steel and Iron Joists, &c.

Dorman, Long, & Co., Ltd.
Measures Brothers, Limited.

Steeplejack Engineers.

Harrison, W. E.

Stone.

See QUARRY.

Stone (Granolithic).

Stuart's Granolithic Paving Co., Limited.

Stoves and Ranges.

Adams, Robt.
Coalbrookdale Co., Ltd.

Strong-Room Doors.

Hobbs, Hart & Co., Ltd.
Tann, John.

Strong-Room Ventilators.

Hobbs, Hart & Co., Ltd.
Tann, John.

Sun Dial Makers.

Barker, F., & Son.

Surveying Instruments.

Harling, W. H.
Stanley, W. F.

Tiles.

Carter & Co.
Edwards, J. C.
Stanley Bros.

Timber.

Pierce, Watts, & Co.

Tube Wells and Pumps.

Le Grand and Sutcliff.

Turnstiles—
(Self Registering).

Le Grand & Sutcliff.

Varnish.

Smith, Powers & Co.

Ventilating Engineers.

Adams, Robt.
Blackman Ventilating Co., Limited.
Jones & Attwood.
Hartley & Sugden.
Hayward Bros. & Eckstein.
Longden & Co.

Ventilating Gates for Strong-Rooms.

Hobbs, Hart & Co., Ltd.
Tann, John.

Wells—Artesian.

Le Grand & Sutcliff.

Wall Papers.

Walton, Fredk., & Co., **Ltd.** (Lincrusta-Walton).
Woollams, Wm., & Co.

Window Blinds.

Collyer, C., & Son.
Soper, John.

Wood Block Flooring.

The Wood Block Flooring Co. (Geary's).

Wood Mouldings.

Smith, Jonas, & Co.

SPONS'

ARCHITECTS' AND BUILDERS' PRICE-BOOK.

ABSORBENT POWERS of stones saturated under exhausted receiver of an air-pump.

(Commissioners' Report.)

Sandstones—	
Craigleith	= 0·143
Heddon	= 0·156
Kenton	= 0·143
Mansfield red	= 0·151
Oolites—	
Ancaster	= 0·180
Bath Box	= 0·312
Portland	= 0·206
Ketton	= 0·244
Magnesian Limestones—	
Bolsover	= 0·182
Huddleston	= 0·239
Roach Abbey	= 0·248
Park Nook	= 0·249
Limestones—	
Barnack	= 0·204
Chilmark	= 0·053
Ham-hill	= 0·147

ALGEBRAIC SIGNS used in the following Memoranda.

The sign = (*equal*) denotes that the quantities between which it stands are equal to one another.

The sign + (*plus*) denotes that the quantities between which it stands are added together.

The sign − (*minus*) denotes that the quantity after it is to be subtracted from the quantity before it.

The sign × (*into*) denotes that the quantities between which it stands are to be multiplied together; but very often a full point is used instead of ×, or, still more commonly, one quantity is placed close after the other without any sign between them. Thus $a \times b$, $a.b$, and ab mean all the same thing, *viz.* a multiplied by b.

$3a$ denotes 3 times a.

÷ (*by*) denotes that the quantity which stands *before* it is to be divided by that which *follows* it, but most frequently the quantity *to be* divided is placed over the other with a line between them.

Thus $a \div b$ and $\frac{a}{b}$ mean the same thing, *viz.* a divided by b.

A small figure above a quantity to the right denotes the *power* or number of times it is to be repeated. Thus

a^1 means the 1st power of a.
a^2 „ 2nd „ or square of a.
a^3 „ 3rd „ or cube of a.
a^4 „ 4th „ of a, &c.

$\surd a$ denotes the square root of a.

$\sqrt[3]{a}$ denotes the cube root of a.

( ) (*brackets*) denote that all the quantities within them are to be treated as forming one quantity. Thus $a - (b - c)$ is not the same as $a - b - c$; for in the last both b and c are subtracted, whereas in the former it is the quantity $b - c$ which is subtracted.

A line drawn over the quantities denotes the same as brackets; thus $a - \overline{b - c}$ is the same as $a - (b - c)$; again, $\frac{a + b - c}{4}$ implies that the product of $a + b - c$ is to be divided by 4.

ANCIENT LIGHTS. (Homersham Cox.)

The way in which the Table is read is as follows:—Suppose an obstacle has an angular height of 40°, and a width which subtends

OBSCURATIONS BY OBSTACLES OF UNIFORM ANGULAR WIDTH AND HEIGHT.

Angular height (v).	Angular width (h).								
	5°	10°	15°	20°	25°	30°	35°	40°	45°
°									
5	·005	·010	·015	·019	·023	·027	·031	·035	·039
10	·010	·019	·028	·037	·046	·055	·063	·070	·077
15	·014	·028	·042	·055	·068	·081	·093	·105	·115
20	·019	·037	·055	·073	·090	·106	·122	·137	·151
25	·023	·045	·067	·089	·110	·130	·149	·167	·184
30	·026	·052	·078	·104	·128	·152	·174	·195	·215
35	·030	·060	·089	·118	·145	·172	·197	·221	·243
40	·033	·066	·098	·129	·160	·189	·217	·243	·268
45	·036	·071	·106	·139	·172	·205	·234	·263	·288
50	·037	·075	·113	·148	·183	·217	·249	·279	·307
55	·040	·079	·118	·155	·192	·227	·261	·293	·322
60	·041	·082	·122	·161	·199	·235	·270	·303	·333
65	·042	·084	·125	·165	·204	·241	·277	·310	·341
70	·043	·085	·127	·168	·208	·245	·282	·316	·347
75	·043	·086	·128	·170	·209	·248	·285	·319	·350
80	·043	·086	·129	·171	·210	·249	·286	·320	·352
85	·043	·086	·129	·171	·211	·250	·287	·321	·353
90	·043	·086	·129	·171	·211	·250	·287	·321	·353

Angular height (v).	Angular width (h).								
	50°	55°	60°	65°	70°	75°	80°	85°	90°
°									
5	·042	·045	·048	·050	·052	·053	·054	·055	·055
10	·084	·090	·095	·099	·103	·106	·108	·109	·109
15	·124	·133	·141	·147	·153	·157	·160	·162	·162
20	·163	·174	·184	·193	·201	·206	·210	·212	·212
25	·199	·214	·225	·236	·245	·252	·256	·260	·260
30	·233	·249	·263	·275	·286	·294	·299	·303	·303
35	·263	·281	·297	·311	·323	·333	·338	·342	·343
40	·290	·310	·328	·344	·356	·366	·373	·377	·378
45	·313	·335	·354	·371	·384	·395	·403	·408	·409
50	·333	·356	·376	·394	·408	·419	·428	·433	·434
55	·349	·373	·394	·413	·427	·439	·448	·453	·455
60	·361	·386	·408	·428	·443	·455	·464	·469	·471
65	·370	·396	·418	·438	·453	·466	·475	·480	·482
70	·376	·402	·425	·445	·462	·475	·484	·489	·491
75	·380	·406	·429	·449	·466	·479	·489	·494	·496
80	·382	·408	·431	·451	·468	·481	·491	·496	·498
85	·383	·409	·432	·452	·469	·482	·492	·497	·499
90	·383	·410	·433	·453	·470	·483	·493	·498	·500

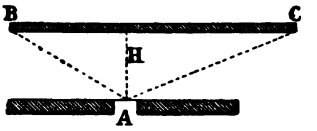
an angle of 30° on one side (say to the right) of the aperture; we look in the side row of figures in the Table for 40°, and in the top row for 30°. The corresponding tabulated figure is 189, or the obscuration is $18\frac{9}{10}$ per cent. of full light. Suppose the *same* obstacle also subtends 20° to the left of the aperture, the height being 40° as before. The tabular figure, corresponding to 20° width and 40° height, is 129, or the obscuration due to this part of the obstacle is $12\frac{9}{10}$ per cent.

Adding the obscurations 189 and 129 together, we get 318, or $31\frac{8}{10}$ per cent. of full light abstracted by the whole obstacle.

The angle for width is always measured from the line perpendicular to the front or plane of the window, and is the angle which the width of the structure subtends at the level of the window. Consequently, if the obstacle extends both to the right and left of the window, the two parts to the right and left must be measured separately, and the obscurations of the two parts are to be added together.

In the annexed Fig. 1, let B C be a horizontal section of the obstacle (the section being taken at the level of the window A),

Fig. 1.

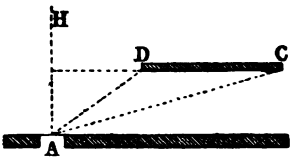


and let A H be a line of any length perpendicular to the plane of the window. Then H A B and H A C are the two angles of width, and the obscurations produced by the two parts of the obstacle which have these widths respectively are to be computed separately. The results added together give the total obscuration.

In the case where the obstacle is wholly to the right (or left) of the window, the process is as follows:—Suppose D C (Fig. 2) is the section of the obstacle, the section being taken on the level of the window A. Let A H be a line of any length perpendicular to the plane of the window. First, measure the obscuration just as if the line D C were continued to meet the line A H; then subtract from the result so much as would be due to an obstacle having the

angle width D A H. For instance, suppose the nearest corner of the obstacle is 15 degrees to the right of the aperture, and the farthest corner is 40 degrees. Suppose the angular height to be 70 degrees.

Fig. 2.



The obscuration due to width 40° and height 70° is, by the Table, ·316. The obscuration due to width 15° and height 70° is, by the Table, ·127. Therefore, ·316 − ·127 = ·189, or $18\frac{9}{10}$ per cent. is the actual obscuration.

RELATIVE ILLUMINATING EFFECTS OF EVERY TEN DEGREES OF SKY MEASURED FROM THE ZENITH.

Arcs of Ten Degrees each.	No. of Rays out of every hundred which the Aperture receives from each Arc.
Between 90° and 80° ..	1·5
„ 80 „ 70 ..	4·5
„ 70 „ 60 ..	7·
„ 60 „ 50 ..	10·
„ 50 „ 40 ..	13·
„ 40 „ 30 ..	14·
„ 30 „ 20 ..	16·
„ 20 „ 10 ..	17·
„ 10 „ 0 ..	17·

ANGLES. See Triangles, p. 131.

APPROXIMATE COST OF BUILDINGS.

	per cubic ft.
Labourers' cottages	4*d.*
Small suburban houses	6*d.* to 8*d.*
Gentleman's country house, 2nd class	8*d.*
Gentlemen's 1st-class mansions—for main building ..	10*d.* to 15*d.*
Gentlemen's 1st-class mansions—for servants' offices	6*d.* to 10*d.*
Stables	7*d.* to 10*d.*
Free public libraries and technical schools—brick ..	8*d.*

	per cubic ft.
Churches (minimum)	6*d.*
Town halls, law courts, and other public buildings of the 1st class	13*d.*
Lunatic asylums and buildings of the class	6*d.* to 7*d.*

COST OF BUILDINGS EXECUTED.

Houses of Parliament	2*s.* 6*d.*
Foreign Offices	1*s.* 0¾*d.*
Manchester Assize Courts	9½*d.*
St. Thomas's Hospital	9*d.*
Hotel Victoria, London	1*s.* 6*d.*
Bow Street Police Station	11*d.*

APPROXIMATE COST OF BUILDINGS. (Professor KERR.)

Total Outlay required.	The Family Department.							The Servants' Department.							Total Outlay resulting.
	1.	2.	3.	4.	5.	6.	7.	1.	2.	3.	4.	5.	6.	7.	
	Price per cubic foot.	Average height of rooms.	Price per superficial square.	Corresponding number of squares.	Cost at the prices given.	Number of rooms to correspond.	Average price per room.	Price per cubic foot.	Average height of rooms.	Price per superficial square.	Corresponding number of squares.	Cost at the prices given.	Number of rooms to correspond.	Average price per room.	
£	*d.*	ft. in.	£		£		£	*d.*	ft. in.	£		£		£	£
1,250	8	12 0	40	22·30	892	13	68	6	11 3	28	12·90	361	13	28	1,253
2,500	9	12 9	48	37·50	1,800	20	90	6½	11 7	31¼	22·20	700	19	37	2,500
5,000	10	13 9	57½	63·10	3,639	30	121	7	12 0	35	39·00	1,365	29	47	5,004
10,000	11	15 0	69	106·00	7,314	45	163	7½	12 6	39½	68·00	2,686	43	62	10,000
20,000	12	16 6	83	178·00	14,774	67	220	8½	13 0	44½	117·70	5,237	65	80	20,011
40,000	13½	18 0	100	298·00	29,800	100	298	9	13 6	50	204·00	10,200	97	105	40,000
80,000	15	19 0	120	501·00	60,120	150	400	10	13 6	56	355·00	19,880	145	137	80,000

ARC.

Given the arc of a circle to find its centre.

Let *a d* (Fig. 3) be an arc of a circle; to find its centre take any three points in the arc *a b d*, and draw straight lines *a b* and *b d*, and bisect them as at *f g* and *h k*, and continue the lines till they intersect at *c*, then *c* is the centre of the arc.

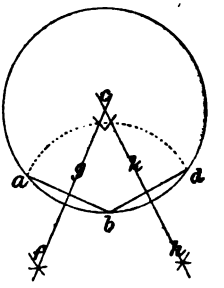
ARCHES.

1. Arches whose voussoirs are of an even number exert more thrust than those which are of an unequal number; that is, which have a keystone.

2. A semicircular arch divided into four parts has more thrust than one divided into nine voussoirs.

3. Thrust does not increase as the thickness of the arch increases, so that, *cæteris paribus*, an arch of double the thickness has not double the thrust.

Fig. 3.



4. A semicircular arch whose extrados is equally distant throughout from, or in other words concentric with, the intrados, when divided into four equal parts, will only stand when its depth is less than the $\frac{1}{15}$th part of its diameter, even supposing the abutments immovable.

5. Arches whose thickness diminishes as they rise to the vertex have less thrust than those whose thickness is equal throughout.

6. Semicircular and segmental arches whose extrados is a horizontal line have less thrust than others.

7. The Metropolitan Building Act requires that a brick arch under a public way of a span not more than 10 feet be at least 8½ inches thick, and of a span not more than 15 feet to be at least 13 inches thick.

Approximate Rules for the Thickness of Arches and Abutments. (Hurst and others.)

D = Depth or thickness of crown in feet.
H = Height of abutment to springing in feet.
R = Radius of arch at crown in feet.
T = Thickness of abutment in feet.
W = Weight of 1 foot in length of half arch in cwt.
n = Constant.

$$D = n\sqrt{R}$$

Single arches:—	Series of arches:—
Block stone $n = \cdot 3$	Block stone $n = \cdot 35$
Brick .. $n = \cdot 4$	Brick .. $n = \cdot 45$
Rubble .. $n = \cdot 45$	Rubble .. $n = \cdot 5$

$$T = \sqrt{\tfrac{1}{6}R^2 + \tfrac{2}{3}R^{\frac{3}{2}} + \left(\frac{W}{H}\right)^2} - \frac{W}{H}.$$

This formula gives the thickness T of abutment, without wing

walls or counterforts, just sufficient to balance the thrust of the half arch, the depth at the crown being equal to $\cdot 4\sqrt{R}$, and the material in the arch and abutment being the same.

RULE SOMETIMES USED FOR RAILWAY BRIDGES.

For spans between 25 and 70 feet—Rise = $\frac{S}{5}$

Thickness of arch = $\frac{S}{18}$

Thickness of abutments $\frac{S}{5}$ to $\frac{S}{4}$

Thickness of pier $\frac{S}{6}$ to $\frac{S}{7}$

Batter (if any) 1 inch to the foot.

TABLE OF THE THICKNESS REQUIRED FOR THE CROWNS OF ARCHES. (Hurst.)

Radius of Curvature.	Stone Arches.	Brick Arches.	Radius of Curvature.	Stone Arches.	Brick Arches.	Radius of Curvature.	Stone Arches.	Brick Arches.
feet.	feet.	feet.	feet.	feet.	feet.	feet.	feet.	feet.
2	·42	·56	14	1·12	1·50	60	2·33	3·10
2½	·47	·63	15	1·16	1·55	65	2·42	3·22
3	·52	·69	16	1·20	1·60	70	2·51	3·35
3½	·56	·75	17	1·24	1·65	75	2·60	3·46
4	·60	·80	18	1·27	1·70	80	2·68	3·58
4½	·64	·85	19	1·32	1·74	85	2·77	3·69
5	·67	·90	20	1·34	1·79	90	2·85	3·80
5½	·71	·94	22	1·41	1·88	95	2·92	3·90
6	·74	·98	24	1·47	1·96	100	3·00	4·00
7	·80	1·06	25	1·50	2·00	110	3·15	4·20
8	·85	1·13	30	1·64	2·19	120	3·29	4·38
9	·90	1·20	35	1·78	2·37	130	3·42	4·56
10	·95	1·26	40	1·90	2·53	140	3·53	4·73
11	1·00	1·33	45	2·01	2·68	150	3·67	4·90
12	1·04	1·38	50	2·12	2·83	160	3·80	5·06
13	1·08	1·44	55	2·22	2·97	170	4·18	5·58

ARCHITECTS' CHARGES.

A SCHEDULE OF RULES

For Professional Practice, and Charges of Architects. Published under the sanction of the Royal Institute of British Architects, and confirmed at a General Conference of Architects of the United Kingdom, 1872.

1. The usual remuneration for an architect's services, except as hereinafter mentioned, is a commission of 5 per cent. on the total cost of the works executed from his designs; besides which, all travel-

ling and other incidental expenses incurred by the architect are paid by the employer, who may be also charged for time occupied in travelling if the work be executed at a considerable or inconvenient distance, or if more than ordinary personal attendance is required.

2. But for all works in which the expenditure is mainly for skilled labour and not for materials, *e. g.* in designs for the fittings and furniture of buildings, for their decoration with painting or mosaic, for their sculpture, for stained glass, and other like work, the architect's charge is not made by way of commission on the cost, but should be regulated by special circumstances and conditions.

3. When several similar but distinct buildings are erected at the same time from a single specification and one set of drawings, and under one contract, the commission of 5 per cent. should be charged on the cost of one such building, and a modified arrangement should be made in respect of the others.

4. In works of small value, say 500*l.* in amount, 5 per cent. is not remunerative, and the charge should be by time or by an ascending scale, reaching 10 per cent. for works under 100*l.*

5. The commission is reckoned upon the total cost of the works, valued as if executed by a builder, and of new materials. 2½ per cent. is charged upon any works originally included in the contract, but subsequently omitted in execution.

This is exclusive of the charge for measuring, extras and omissions.

6. The architect is entitled during the progress of the building to payment on account at the rate of 5 per cent. on the instalments paid to the builder, or otherwise to half the commission on the signing of the contract, or the commencement of the works, and the remainder by instalments as above.

N.B.—The terms of payment adopted by Her Majesty's Office of Works and Public Buildings may also be taken as an equitable method of payment on account, *viz.*:—

One-third part of the commission shall be paid to the architect immediately after the signing of the contract;

One-third part shall be paid to the architect as soon as one-half of the contract sum has been paid to the builder;

And the remaining one-third part shall be paid to the architect after the final payment to the builder.

7. The above charges do not cover professional services in connection with negotiations for site, in surveying it and taking levels, in making surveys and plans of buildings to be altered, in arrangements respecting party walls, or right of lights, nor services incidental to arrangements consequent upon the failure of builders whilst carrying out work, or in case of subsequent litigation; but all such services are charged for in addition.

8. If the employer, after having agreed to a design, and had the contract drawings prepared, should have material alterations made, whether before or after the contract is prepared, an extra charge should be made, unless such alterations are rendered necessary by an unreasonable excess in the builder's tender beyond the architect's approximate estimate.

9. If the architect should have drawn out the approved design complete, with plans, elevations, sections, and specification, the charge is half the commission upon the estimated cost. If he should, in addition, have procured tenders in accordance with the instructions of his employer, the charge is one-half per cent. extra.

10. For works in the alteration of premises, a special charge may be made on account of the special difficulties and trouble generally involved.

11. The following are the professional services included in the ordinary charge of 5 per cent.:—

The requisite preliminary sketches, drawings, and specifications sufficient for an estimate and contract.

Detailed drawings and instructions for execution.

One set of tracings and duplicate specification.

General superintendence of works (exclusive of clerk of the works).

Examining and passing the accounts, exclusive of measuring and making out extras and omissions.

12. No additional remuneration is due for making an approximate estimate, such as may be obtained, for instance, by cubing out the contents. If a detailed estimate be required by the employer, an additional percentage charge may be made.

13. The charge per day made by architects depends upon their professional position, the minimum charge being three guineas per day.

14. The above payments alluded to in this document are to be made by the employer to the architect, who is not to receive com-

mission or payment of any kind from the builder, or any tradesman, in respect of works executed under the architect's direction.

15. When an architect supplies builders with quantities, on which to form tenders for executing his designs, he should do so with the concurrence of his employer, and it is desirable, when practicable, that the architect should be paid by him rather than by the builder, the cost of such extra labour not being included in the commission of 5 per cent.

16. In respect of the ownership of drawings and specifications, it has hitherto been the general custom for the architect to be paid for their use only, those documents remaining his property.

N.B.—In case of sketches for works abandoned, this custom is recognized by the office of Her Majesty's Works and Public Buildings. No authoritative decision in the Courts of Law has, however, as yet been given on the subject: it is therefore desirable, for the present at least, that the architect should have a distinct understanding with his employer on this point.

Estates.

17. The charge for taking a plan of an estate, laying it out, and arranging for building upon it, should be regulated by the time, skill, and trouble involved.

18. For actually letting the several plots (in ordinary cases) a sum not exceeding a whole year's ground-rent may be charged.

19. For inspecting the buildings during their progress (so far as may be necessary to ensure the conditions being fulfilled) and finally certifying for lease, the charge should be a percentage not exceeding one-half per cent. up to 5000*l.*, and above that by special arrangement.

20. All the above fees to be exclusive of travelling expenses, and time occupied in travelling as before mentioned.

21. The charge for the above does not include the commission for preparing specification, directing, superintending, and certifying the proper formation of roads, fences, and other works executed at the cost of the employer, nor for putting the plans on the leases.

Valuations.

22. The following definite charges are recognized for valuation of property:—

The charge throughout is 1 per cent. on the first 1000*l.*, and half

per cent. on the remainder up to 10,000*l.* Below 1000*l.* and beyond 10,000*l.* by special arrangement. These charges do not include travelling expenses, nor attendance before juries, arbitrators, &c.

Dilapidations.

23. The charge for estimating dilapidations is 5 per cent. on the estimate, and in no case less than two guineas.

Boundaries.

1. In the absence of plans, figures, or rebutting circumstances, where a fence or hedge and a ditch are conjoined, the landowner on whose side the fence or hedge stands claims the latter; the theory being that excavated soil was cast on the digger's land as groundwork for his barrier, which thus with the ditch forms the boundary, and the limit being the outer bank from the fence or hedge. Property in a fence or hedge between ditches, or without ditch, may be joint or rest on acts of ownership of long standing, as executing repairs, especially on demand.

2. Posts and rails of paling are presumed to stand wholly on the owner's land, with pales outwards, and nails driven home.

3. Where a stream flows between properties, the presumptive boundary is the central line of water, use of which is shared between opposite owners, neither being entitled to injuriously affect the other or proprietors above or below by obstructing, diverting, diminishing, or polluting it.

BRICKLAYERS' MEMORANDA.

Size and Weight of Bricks.

	Length in ins.	Breadth in ins.	Thickness in ins.	Weight each.	Weight per 1000.
				lb.	cwt.
London stocks ..	8¾	4¼	2¼	6·8	60¾
Red kiln	8¾	4¼	2¼	7·	63
Paving	9	4½	1¾	5·	45
Dutch clinkers ..	6¼	3	1½	1·5	14

1¼ brick or 13 inches is the standard thickness.

1 rod of brickwork = 272 feet superficial of standard thickness.
" " = 408 feet superficial, 1 brick thick.
" " = 306 cubic feet, *viz.* 235 feet cub. of bricks and 71 feet cub. of mortar.
" " = 11⅛ cubic yards.
" " requires 4300 stock bricks laid in mortar, or
" " " 5370 ditto laid dry.
" " " 4900 stock bricks laid dry in wells and circular cesspools.

1 rod of brickwork requires 1 cubic yard of stone lime and 3½ yards of sand.
" " " 1½ cubic yard of chalk lime and 3 yards of drift.
" " " 36 bushels cement and 36 bushels of sand.
" " " about 126 gallons of water to slake the lime and mix the mortar.
" " weighs about 14 tons.

To reduce brickwork from superficial feet of 9 inches thick, or 1 brick, to standard thickness, deduct ⅓rd.

To reduce brickwork from cubic feet to superficial feet of standard thickness, deduct ⅑th.

Bricks absorb about $\frac{1}{16}$th their weight in water.

1000 bricks closely stacked occupy about 55 cubic feet.

1 sup. ft. of reduced brickwork requires 16 bricks.
" of gauged arches requires 10 bricks.
" of facings requires 7 bricks.
1 sup. yard of brick nogging requires 45 stock bricks laid flat, and ¾ cubic foot mortar.
" of brick nogging requires 30 stock bricks on edge. and ½ cubic foot mortar.
" of paving requires 36 stock bricks laid flat.
" " " 52 stock bricks laid on edge.
" " " 36 paving bricks laid flat.
" " " 90 paving bricks on edge.
" " " 13 10-in. tiles or 9 12-in. tiles.
" " " 125 Dutch clinkers laid flat.
" " " 140 Dutch clinkers, on edge.
" " " 136 Dutch clinkers, herring-bone.

330 stock bricks .. .. weigh 1 ton.
1000 " .. .. " 60¾ cwt.
1000 red kiln bricks .. .. " 63 "
1000 paving " .. .. " 45 "
1000 Dutch clinkers, 6¼ in. × 3 in. × 1½ in. .. .. " 14 "
1000 paving tiles, 6 in. × 6 in. × 1 in. .. .. .. " 19¼ "
1000 ditto, 9¾ in. × 9¾ in. × 1 in. .. .. " 2½ tons.

500 bricks = 1 cart load.
27 hods of mortar = 1 yard.

A bricklayer's hod measures 16 in. × 9 in. × 9 in.
" " will hold 20 bricks.
" " " $\frac{3}{5}$rds cubic foot of mortar.
" " " $\frac{1}{2}$ bushel (nearly).

Lime, sand, and cement required for 1 rod of brickwork:—

Dorking lime	36	cubic feet.
Sand	72	
Blue Lias lime	38	
Sand	77	"
Portland or Roman cement	45	
Sand	45	"

Pointing brickwork requires:—

For flat joint, $\frac{1}{8}$th cub. foot of mortar per yard sup.

Tuck .. $\frac{1}{8}$th " " "
$\frac{1}{8}$th " putty

BRICKWORK.

In dry weather the bricks should be thoroughly soaked before laying. Each course of bricks should be fully flushed with mortar, and every fourth course should be grouted, for strong work.

BRICKS, quality of.

Well-burnt bricks will give a clear ringing sound when clapped together; but some facing bricks, which do not ring like a stock brick, are found to harden by exposure, and stand the weather well.

STRENGTH OF BRICKWORK. (From Experiments.)

Cubitt.	Yielded to	Crushed by	Remarks.
	tons.	tons.	
Good place bricks ..	11	16½	Bedded on plaster.
" " ..	16	22	" "
Two common stocks ..	10	16	No plaster. "
Good stock	30	34	
Superior washed ditto	36	44½	
Ordinary place brick ..	3	9	

A pressed and kiln-burnt stock, made for superior purposes, ground on both sides to get a true bed, *bore a pressure of* 60 *tons* (the limit of the power of the ram used), *and was taken out sound and uninjured.* A similar brick, *not* ground, but faced with plaster, resisted the same pressure without crushing, but was slightly broken at the edges.

Weight of Brickwork.

	Weight of a cubic foot.	Cubic feet = 1 Ton.
	lb.	
Brickwork in mortar	100	22⅜
„ cement	110	20⅜

Size of Roman Bricks.

('Glossary of Architecture.')

Where found.	Size of Brick. Length. in.		Breadth. in.		Thickness. in.
Bognor, Sussex	8	×	8	×	1
„ „	8	×	1	×	1¼
„ „	11	×	11	×	1¼
„ „	13	×	10¼	×	1½

Size of Roman Bricks.

Where found.	Size of Brick. Length. in.		Breadth. in.		Thickness. in.
St. Albans	18	×	12	×	1⅜
Eynesford Castle, Kent	8½	×	8	×	2
„ „	14	×	11¼	×	1⅝
„ „	16	×	11½	×	1⅜
Autun, France	17¼	×	12½	×	2½
Tours	14	×	12	×	1½
Lillebonne	8¼	×	8¼	×	1¼

Some of the Roman bricks are deeply scratched on the surface for the purpose of making the mortar adhere to them.

Pounded bricks were used in the mortar, which gave it a reddish colour.

Memoranda of Spanish Brickwork.

Ordinary Cuban bricks measure 10″ × 5″ × 1·5″ thick.

One cubic foot of Cuban brickwork requires 15 Cuban bricks = 1125 cubic inches, nearly ⅔ cubic foot.

One cubic foot of Cuban brickwork contains 603 cubic inches mortar.

One metre (cube) of Cuban brickwork requires 530 Cuban bricks = ·680 metre.

One metre (cube) of Cuban brickwork contains ·320 metre mortar.

BOND in brickwork.

English bond (which is the strongest) is a course of stretchers and a course of headers alternately, or one course of headers and one course of stretchers.

Flemish bond is a header and stretcher laid alternately in the same course.

Hoop-iron bond (Tyerman's patent has the edges notched, which increases its utility) should be well tarred and sanded, and should be bedded in cement.

Flemish bond was introduced into England in the time of William III.; previous to that period old English bond was used.

CARPENTERS' MEMORANDA.

A load of timber contains 50 cubic feet.
120 deals = one hundred.
100 feet super. = to a square of boarding or flooring.
400 feet super. of 1½-in. deal = to one load.
600 „ 1-in. „ „
100 12-ft. 3-in. deals, 9 in. wide = to 5⅔ loads.
100 12-ft. 2½-in. „ „ „ 4½ „
Battens are 7 in. wide.
Deals „ 9 „ „
Planks „ 11 „ „
A deal when reduced is 12 ft. long, 11 in. wide, and 1½ in. thick.

45	cubic feet of	ash	equal 1 ton.
51	„	beech	„
66	„	deals	„
60	„	elm	„
64	„	fir	„
35	„	mahogany	„
39	„	oak	„

With 12-ft. deals a square of flooring requires :—
13 boards if wrought and laid folding.
13½ „ if laid straight joint.
14 „ „ „ „ and ploughed and tongued.
Or to the square there are required :—
20 12-ft. boards to a 5-in. gauge.
16 „ „ „ 6 „ „
14 „ „ „ 7 „ „

Materials for deal mouldings about equal the labour.

Four score of 6-ft., 5 score of 5-ft., and 6 score of 4-ft. cleft oak pales go to the hundred.

DEAL STANDARDS.—TABLE SHOWING THE CUBICAL CONTENTS OF PLANKS, DEALS, AND BATTENS.

Length in feet.	Battens, 7 in. × 3 in.	Battens, 7 in. × 2½ in.	Deals, 9 in. × 3 in.	Deals, 9 in. × 2½ in.	Planks, 11 in. × 3 in.	Planks, 11 in. × 2½ in.
	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.
8	1 2 0	0 11 8	1 6 0	1 3 0	1 10 0	1 6 4
10	1 5 6	1 2 7	1 10 6	1 6 9	2 3 6	1 10 11
12	1 9 0	1 5 6	2 3 0	1 10 6	2 9 0	2 3 6
14	2 0 6	1 8 5	2 7 6	2 2 3	3 2 6	2 8 1
16	2 4 0	1 11 4	3 0 0	2 6 0	3 8 0	3 0 8
18	2 7 6	2 2 3	3 4 6	2 9 9	4 1 6	3 5 3
20	2 11 0	2 5 2	3 9 0	3 1 6	4 7 0	3 9 10

TABLE SHOWING THE NUMBER OF EACH EQUAL TO A LOAD OF TIMBER 50 CUBIC FEET.

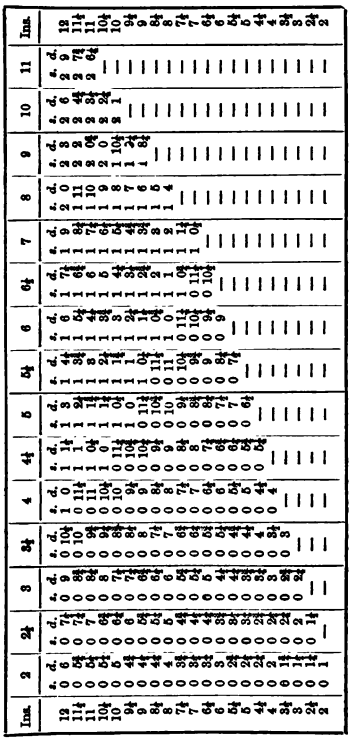
8	43	51½	33⅓	40	27½	32½
10	34½	41¼	26⅔	32	22	26
12	28⅔	34¼	22⅔	26⅔	18½	22
14	24½	29½	19	23	15½	18½
16	21½	25⅝	16⅔	20	13½	16½
18	19	23	15	17⅞	12½	14½
20	16⅞	20½	13⅓	16	11	13

STRENGTH OF TIMBER.

The strength of a piece of timber *fixed* at both ends, and loaded in the middle, is to that of a like piece only *supported* at both ends and loaded in the middle as 3 to 2; that is, the first will bear one-third more weight than the second.

The duties of king post and queen post being suspension, they may be efficiently, and in some cases advantageously, replaced by wrought-iron rods; from $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. diameter will in almost any case be sufficient.

TABLE SHOWING THE VALUE PER FOOT RUN OF TIMBER CUT TO SCANTLINGS AT THE RATE OF 3d. PER FOOT CUBE.



TENON AND MORTISE.

The size or sectional area of the mortise should be exactly equal to that of the tenon, but the depth of the mortise should rather

exceed that of the tenon, so that the weight may bear on the shoulders and not on the head of the tenon.

The price of timber in scantlings, at 3*s.* per cubic foot, is equal per foot run to one farthing per square inch of sectional area.

EXAMPLE AT 3*s.* PER FOOT CUBE.

Scantlings.

4 in. × 3 in. = 12 at ¼*d.* = 3*d.* per foot run.
6 in. × 4 in. = 24 „ ¼*d.* = 6*d.* „
12 in. × 6 in. = 72 „ ¼*d.* = 1*s.* 6*d.* „

DEAL STANDARDS.

	Length.	Breadth.	Thickness.	Contents.
	ft.	ins.	ins.	Cubic ft. in. pts.
Russia and Prussia	12	11	1¼	1 4 6
Sweden	14	9	3	2 7 6
Quebec	12	11	2¼	2 3 6
Christiania ..	11	9	1¼	0 8 5
Norway	12	9	3	2 3 0
Dram	10	—	1¼	—

16 feet 6 run = 1 rod fencing.

To find the value of timber per foot cube from the prime cost per load,

Rule.—To the price of the timber at the yard add 1*l.* per load for sawing and carting, and multiply the number of pounds by 6¼*d.*, which will give the price per cubic foot, with 20 per cent. for profit and waste.

Example—

	£	*s.*	*d.*	
Prime cost at yard	3	0	0	per load.
Sawing and cartage	1	0	0	„
	4	0	0	
	0	0	6¼	
	0	2	2	per ft. cube.

CASTINGS.

To find the weight of castings from the pattern,

multiply weight of deal pattern by 17 for cast iron.
„ „ „ „ 18 „ brass.
„ „ „ „ 19 „ copper.
„ „ „ „ 25 „ lead.

CEMENTS. (Haswell.)

Hydraulic cements contain a larger proportion of silica, alumina, magnesia, &c., than hydraulic limes. They do not slake after

calcination, and some of them set under water at a temperature of 65° in from 3 to 5 minutes; others require as many hours.

*Roman cement** is made from a lime of a peculiar character found in England and France, derived from argillo-calcareous kidney-shaped stones termed "Septaria," and when mixed thick it solidifies in a few minutes, either in air or water.

1. *Portland cement* is made in England and France, from an argillo-calcareous deposit, which is burned and ground up for cement in its natural state, without the addition of lime.

2. Strong Portland cement is heavy, weighing 110 lb. to the bushel. Weak cement is light.

3. Strong cement is of a blue-grey colour, and sets slowly. Weak cement sets quickly, has too much clay in it, and is of a brownish colour.

4. The cleaner and sharper the sand, and the less water used in mixing the cement, the stronger it will be.

5. At the end of one year after setting, 1 of sand and 1 of cement is about $\frac{2}{3}$ths the strength of neat cement.

2 of sand and 1 of cement is about $\frac{1}{2}$ the strength of neat cement.

3 of sand and 1 of cement is about $\frac{1}{3}$rd the strength of neat cement.

4 of sand and 1 of cement is about $\frac{1}{4}$th the strength of neat cement.

5 of sand and 1 of cement is about $\frac{1}{5}$th the strength of neat cement.

6. Portland cement, as employed in metropolitan drainage works, weighs 110 lb. to the bushel, and maintains a breaking weight of 500 lb. on $1\frac{1}{2}$ square inch, seven days after being made, and immersed in water during the seven days.

---

1 cask of Portland cement = 4 bushels (nominally).
1 cask of Roman cement = 5 bushels (nominally).
1 cask of Portland cement holds 5 cubic feet, and weighs $3\frac{1}{4}$ cwt.
1 cask of Roman cement holds $3\frac{1}{4}$ cubic feet (but they can be made to hold $3\frac{1}{4}$ bushels), and the weight is $3\frac{1}{4}$ cwt.

	Thickness.		
	1 in.	½ in.	¼ in.
	yards.	yards.	yards.
1 bushel of cement will cover	1¼	1¼	2¼
1 bushel of cement and 1 of sand will cover	2¼	3	4¼
1 bushel of cement and 2 of sand will cover	3¼	4¼	6¼

* Roman cement is only about ⅓rd the strength of Portland cement.

CHAINS.

To find the breaking weight in tons, divide the square of the diameter of one bar of the link in sixteenths of an inch by 9.

SAFE WORKING LOAD OF CHAINS.

Diameter of Iron.	Working Load.	Diameter of Iron.	Working Load.
inch.	tons.	inch.	tons.
$\frac{3}{8}$	1	$\frac{15}{16}$	6·2
$\frac{1}{2}$	1·7	1	7
$\frac{9}{16}$	2·2	$1\frac{1}{16}$	8
$\frac{5}{8}$	2·8	$1\frac{1}{8}$	9
$\frac{11}{16}$	3·3	$1\frac{3}{16}$	10
$\frac{3}{4}$	4	$1\frac{1}{4}$	11
$\frac{13}{16}$	4·6	$1\frac{5}{16}$	12
$\frac{7}{8}$	5·5	$1\frac{3}{8}$	13·5

CHIMNEYS.

Chimneys in an outside wall are more liable to smoke than those built in an inside wall, and the back of a chimney so built should not be less than 14 inches thick.

All chimneys should be carried 6 or 7 feet above the ridge of roof.

Short chimneys should be smaller than the usual size, and the fire-place should be kept low.

See also Smoky Chimneys, below.

SMOKY CHIMNEYS. (Edwards.)

Chimneys that smoke in consequence of a descending current existing or being produced in the chimney.

Causes.	*Remedies.*
From a fire-place being too open.	To contract the size of the fire-place, or use a contracted grate.
From a chimney being very short.	To use a contracted grate with a blower; to reduce the height of the fire-place and the size of the chimney; to lengthen the chimney; to reduce the opening into the chimney at top and bottom.

Chimneys that smoke in consequence of a descent of wind.

Causes.	*Remedies.*
From the top of a chimney being below a pitched roof.	To heighten the flue that its top may be above the source of obstruction.
From the top of a chimney being situated near to a tower, or a similar source of obstruction to the wind.	To use a simple protection, to cover the top of flue.

See also Chimneys, p. 21.

CHURCHES.

THICKNESS OF WALLS REQUIRED BY THE INCORPORATED SOCIETY FOR PROMOTING BUILDING, &c., OF CHURCHES.

	Dressed Stone, the best quality, or brick.	Brick, faced with Flint or Stone, or inferior Stone, Flint, or Rubble.
	ft. in.	ft. in.
If less than 20 feet high, and carrying a roof not exceeding 20 feet span	1 10½	2 3
If 20 feet high and under 30 feet, or carrying a roof exceeding 20 feet span	2 3	2 6
If more than 30 feet high	2 7½	3 0

NOTE.—The arcade walls being measured from the caps of the piers, and the gable walls from the ground level to half the height of roof.

Space between front seats in chancel to be 6 feet where span is under 13 feet, and not less than 8 feet when that span is exceeded.

Passage up the whole length of the centre of church not less than 3 feet 6 inches wide where the width of nave is under 18 feet, and 4 feet when this width is exceeded.

Distance between seats:—not less than 2 feet 9 inches from centre to centre of backs when backs are perpendicular, and not less than 2 feet 10 inches when backs are sloping. 3 feet is recommended as distance from centre to centre of seats.

Seats:—20 inches in length for each adult.
14 „ „ „ child.

Seats intended exclusively for children to be at least 26 inches from back to front.

RCLE.

Properties of the Circle.

Diameter	× 3·14159	= circumference.
Diameter	× ·886226	= side of an equal square.
Diameter	× ·7071	= side of an inscribed square.
Diameter²	× ·7854	= area of circle.
Radius	× 6·28318	= circumference.
Circumference	× ·31831	= diameter.
Circumference	= 3·5446 $\sqrt{\text{area of circle.}}$	
Diameter	= 1·1283 $\sqrt{\text{area of circle.}}$	
Length of arc	= number of degrees × ·017453 radius.	

AL.

Space occupied by 1 Ton.

	cubic feet.
Welsh	39 to 43
Lancashire	44
Newcastle	45
Scotch	43
Navy allowance	48

Weight of Coal per Cubic Foot.

	lb.
Welsh	53 to 58½
Lancashire	50
Newcastle	50
Scotch	53

COLUMNS, Strength of. (Hodgkinson.)

= Breaking weight in tons. D = External diameter of column in inches.
= Length of column in feet. d = Internal „ „ „

ature of Column.	Both ends rounded when L exceeds 15 D.	Both ends flat when L exceeds 30 D.
cylinders of cast n	$W = 14{\cdot}9 \frac{D^{3{\cdot}76}}{L^{1{\cdot}7}}$	$W = 44{\cdot}16 \frac{D^{3{\cdot}55}}{L^{1{\cdot}7}}$
w ditto	$W = 13 \frac{D^{3{\cdot}76} - d^{3{\cdot}76}}{L^{1{\cdot}7}}$	$W = 44{\cdot}34 \frac{D^{3{\cdot}55} - d^{3{\cdot}55}}{L^{1{\cdot}7}}$
square of Dantzic (dry)		$W = 10{\cdot}95 \frac{D^4}{L^2}$
square of red l (dry)		$W = 7{\cdot}81 \frac{D^4}{L^2}$

For Short Columns when L is less than 30 D.

= Breaking weight of short columns.
= Breaking weight of long columns as above.
= Crushing force of material of which column is formed × sectional area of column.
$= \frac{W C}{W + \frac{1}{4} C}$.

CAST-IRON COLUMNS. (Hurst.) $\frac{1}{10}$th of Breaking Weight in tons of *Solid* Columns, ends flat and fixed.

Diam. in inches.	Length of Column in feet.								
	6	8	10	12	14	16	18	20	25
1¼	·82	·50	·34	·25	·19	·15	·13	·11	..
2	2·31	1·41	·97	·71	·55	·44	·36	·30	..
2½	5·15	3·16	2·16	1·58	1·22	·97	·80	·66	..
3	9·93	6·09	4·17	3·06	2·35	1·87	1·53	1·28	..
3½	17·29	10·60	7·26	5·32	4·10	3·26	2·67	2·23	..
4	27·96	17·15	11·73	8·61	6·62	5·28	4·32	3·61	..
4½	42·73	26·20	17·93	13·15	10·12	8·07	6·60	5·52	..
5	62·44	38·29	26·20	19·22	14·79	11·79	9·65	8·06	5·52
5½	88·00	53·97	36·93	27·09	20·84	16·61	13·60	11·37	7·78
6	120·4	73·82	50·51	37·05	28·51	22·72	18·60	15·55	10·64
6½	160·6	98·47	67·38	49·43	38·03	30·31	24·81	20·74	14·19
7	209·7	128·6	87·98	64·53	49·66	39·57	32·39	27·08	18·53
7½	268·8	164·8	112·8	82·73	63·66	50·73	41·53	34·72	23·76
8	339·1	207·9	142·3	104·4	80·31	64·00	52·39	43·80	29·97
8½	421·8	258·6	177·0	129·8	99·90	79·61	65·16	54·48	37·28
9	518·2	317·7	217·4	159·5	122·7	97·80	80·05	66·92	45·80
9½	629·5	386·0	264·2	193·8	149·1	118·8	97·25	81·70	55·64
10	757·2	464·3	317·7	233·1	179·3	142·9	117·0	97·79	66·92
10½	902·6	553·5	378·7	277·8	213·8	170·3	139·4	116·6	79·77
11	1067·1	654·4	447·8	328·5	252·7	201·4	164·9	137·8	94·31
11½	1252·3	767·9	525·5	385·4	296·6	236·4	193·5	161·7	110·7
12	1459·6	895·1	612·5	449·3	345·7	275·5	225·5	188·5	129·0

CAST-IRON HOLLOW COLUMNS.—SAFE LOAD AT $\frac{1}{10}$TH BREAKING WEIGHT.

External Diameter.	Thickness of Metal.	Length in feet.				
		8	10	12	14	16
in.	in.	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.	tons. cwt.
3	½	4 0	3 4	2 6	1 15	1 8
3	¾	5 7	3 15	2 15	2 4	1 12
4	½	8 0	6 0	4 12	3 10	3 5
4	¾	11 5	8 10	6 10	4 15	3 15
5	½	13 5	10 7	8 5	6 12	5 6
5	¾	18 15	14 15	11 12	9 0	7 12
5	1	23 10	18 10	14 15	11 16	9 10
6	½	19 0	15 10	12 12	9 10	8 13
6	¾	27 0	22 5	18 5	15 0	12 10
6	1	34 10	28 5	23 3	19 0	15 15
7	¾	38 0	30 10	25 15	21 12	18 6
7	1	46 3	39 0	33 0	27 15	23 10
7	1¼	55 5	46 15	39 10	33 3	28 4
8	¾	45 0	39 2	34 0	29 0	25 0
8	1	58 5	50 10	43 12	37 10	32 8
8	1¼	70 0	61 0	51 10	45 5	39 0
9	1	..	61 10	54 5	47 0	41 5
9	1¼	..	74 10	65 12	57 5	50 4

Tables of the Breaking and Safe Strengths of Cast-iron Stancheons. (Dod.)

The following Tables show the strengths of cast-iron stancheons of the cross-with-equal-arms form, as calculated by Gordon's formula $W = 36 \div 1 + \frac{3\,L^2}{400\,D^2}$, where

W = the breaking weight in tons per square inch *of section*.
L = length in *inches*.
D = diameter in *inches*.

The figures in the columns marked S.L. are the *safe loads in tons*, or $\frac{1}{10}$th the breaking weights.

Example of the Use of the Tables.

Suppose a stancheon is wanted 10 ft. 5 in. long (or high), and to carry 60 tons safely, turn to the Table marked 10 ft. 6 in. high (which is near enough for practical purposes), and by inspecting the columns marked S.L. it will be seen that a stancheon 10 in. × 10 in. × 2 in. thick will safely carry 59·2 tons; one 11 in. × 11 in. × 1¼ in. will safely carry 55·8 tons, and one 12 in. × 12 in. × 1¼ in. will also carry safely 66·5 tons; out of these three, choice can easily be made to suit circumstances.

Note.—The one 12 in. × 12 in. × 1¼ in., although strongest, will weigh the least, as the larger the diameter the greater the strength per square inch.

Stancheons—7 ft. high.

Sect.	S.L.	Sect.	S.L.	Sect.	S.L.
6 × 6 × ¼	8·4	7 × 7 × ¼	11·7	8 × 8 × ¼	15·3
,, ½	12·3	,, ½	17·2	,, ½	22·5
,, 1	16·0	,, 1	22·5	,, 1	29·6
,, 1¼	23·0	,, 1¼	32·4	,, 1¼	42·8
,, 1½	26·1	,, 1½	37·1	,, 1½	49·1
,, 2	29·1	,, 2	41·5	,, 2	55·2
9 × 9 × ¼	19·0	10 × 10 × ¼	22·9	11 × 11 × ¼	26·9
,, ½	28·1	,, ½	34·0	,, ½	39·9
,, 1	37·0	,, 1	44·7	,, 1	52·6
,, 1¼	53·9	,, 1¼	65·3	,, 1¼	77·0
,, 1½	61·9	,, 1½	75·2	,, 1½	88·8
,, 2	69·7	,, 2	84·7	,, 2	100·2

Stancheons—8 ft. high.

Sect.	S.L.	Sect.	S.L.	Sect.	S.L.
7 × 7 × ¼	10·1	8 × 8 × ¼	13·4	9 × 9 × ¼	17·0
,, ½	14·8	,, ½	19·8	,, ½	25·2
,, 1	19·4	,, 1	26·0	,, 1	33·0
,, 1¼	28·0	,, 1¼	37·6	,, 1¼	48·1
,, 1½	31·9	,, 1½	43·2	,, 1½	55·2
,, 2	35·8	,, 2	48·5	,, 2	62·2
10 × 10 × ¼	20·8	11 × 11 × ¼	24·6	12 × 12 × ¼	28·6
,, ½	30·7	,, ½	36·5	,, ½	42·4
,, 1	40·4	,, 1	48·1	,, 1	55·9
,, 1¼	59·1	,, 1¼	70·4	,, 1¼	82·1
,, 1½	68·0	,, 1½	81·2	,, 1½	94·7
,, 2	76·6	,, 2	91·6	,, 2	107·0

STANCHEONS—10 ft. 6 in. high.

Sect.	S.L.	Sect.	S.L.	Sect.	S.L.
7 × 7 × ¼	7·1	8 × 8 × ¼	9·8	9 × 9 × ¼	12·8
,, ⅜	10·4	,, ⅜	14·4	,, ⅜	18·8
,, 1	13·6	,, 1	18·9	,, 1	24·8
,, 1¼	19·7	,, 1¼	27·4	,, 1¼	36·1
,, 2	25·2	,, 2	35·2	,, 2	46·6
10 × 10 × ¼	16·0	11 × 11 × ¼	19·5	12 × 12 × ¼	23·2
,, ⅜	23·7	,, ⅜	28·9	,, ⅜	34·4
,, 1	31·2	,, 1	38·1	,, 1	45·3
,, 1¼	45·6	,, 1¼	55·8	,, 1¼	66·5
,, 2	59·2	,, 2	72·6	,, 2	86·7

STANCHEONS—12 ft. high.

Sect.	S.L.	Sect.	S.L.	Sect.	S.L.
7 × 7 × ¼	5·8	8 × 8 × ¼	8·1	9 × 9 × ¼	10·8
,, ⅜	8·6	,, ⅜	12·0	,, ⅜	15·9
,, 1	11·2	,, 1	15·8	,, 1	21·0
,, 1¼	16·2	,, 1¼	22·8	,, 1¼	30·5
,, 2	20·7	,, 2	29·4	,, 2	39·4
10 × 10 × ¼	13·7	11 × 11 × ¼	16·9	12 × 12 × ¼	20·3
,, ⅜	20·3	,, ⅜	25·1	,, ⅜	30·2
,, 1	26·7	,, 1	33·1	,, 1	39·8
,, 1¼	39·1	,, 1¼	48·4	,, 1¼	58·4
,, 2	50·7	,, 2	63·0	,, 2	76·2

STANCHEONS—14 ft. high.

Sect.	S.L.	Sect.	S.L.	Sect.	S.L.
8 × 8 × ¼	6·5	9 × 9 × ¼	8·7	10 × 10 × ¼	11·3
,, ⅜	9·6	,, ⅜	12·9	,, ⅜	16·7
,, 1	12·5	,, 1	16·9	,, 1	21·9
,, 1¼	18·2	,, 1¼	24·7	,, 1¼	32·0
,, 1½	20·8	,, 1½	28·3	,, 1½	36·9
,, 2	23·4	,, 2	31·9	,, 2	41·6
11 × 11 × ¼	14·0	12 × 12 × ¼	17·1	13 × 13 × ¼	20·4
,, ⅜	20·8	,, ⅜	25·4	,, ⅜	30·3
,, 1	27·4	,, 1	33·5	,, 1	40·0
,, 1¼	40·2	,, 1¼	49·2	,, 1¼	58·8
,, 1½	46·3	,, 1½	56·8	,, 1½	67·8
,, 2	52·3	,, 2	64·1	,, 2	76·7

STANCHEONS—16 ft. high.

Sect.	S.L.	Sect.	S.L.	Sect.	S.L.
8 × 8 × ¼	5·2	9 × 9 × ¼	7·1	10 × 10 × ¼	9·6
,, ⅜	7·7	,, ⅜	10·5	,, ⅜	14·2
,, 1	10·2	,, 1	13·9	,, 1	18·7
,, 1¼	14·7	,, 1¼	20·2	,, 1¼	27·3
,, 1½	16·9	,, 1½	23·2	,, 1½	31·4
,, 2	18·9	,, 2	26·1	,, 2	35·4
11 × 11 × ¼	11·8	12 × 12 × ¼	14·5	13 × 13 × ¼	17·4
,, ⅜	17·4	,, ⅜	21·5	,, ⅜	25·9
,, 1	23·0	,, 1	28·4	,, 1	34·1
,, 1¼	33·7	,, 1¼	41·6	,, 1¼	50·2
,, 1½	38·8	,, 1½	48·0	,, 1½	57·9
,, 2	43·8	,, 2	54·2	,, 2	65·6

A COMPARISON OF THE STRENGTHS OF A CAST-IRON STANCHEON, AND TWO CAST-IRON COLUMNS, ALL OF THE *same weight and height.*

STANCHEON .. { 12 in. × 12 in. × 2 in., 8 ft. high, weighs 1098 lb. Breaking weight 1070 tons.

COLUMN .. .. { 1·167 in. thick, 8 ft. high, weighs 1098 lb. Breaking weight 1751 tons.

COLUMN .. .. { 2 in. thick, 8 ft. high, weighs 1098 lb. Breaking weight 1032 tons.

Metal disposed in the form of a *well-proportioned* column will give the best result. The stancheon form has the great advantage of being easily examined. The last example shows a *badly proportioned* column.

A TABLE SHOWING THE VALUE OF W IN THE FORMULA DESCRIBED IN PAGE 24, BEING THE BREAKING WEIGHT IN TONS PER SQUARE INCH OF SECTIONAL AREA OF VARIOUS SIZES OF STANCHEONS.

Example:

A stancheon 10 in. diameter and 2 in. thick, which gives a sectional area of 36 square inches, if 10 ft. 6 in. long, will require 16·43 tons per square inch to break it, and therefore 16·43 tons × 36 in. = 591 tons the breaking weight, *or* 59·1 *tons safe load.*

LENGTH IN FEET.

Diam. in inches.	6 ft. 6 in.	7 ft.	7 ft. 6 in.	8 ft.	8 ft. 6 in.
6	15·86	14·58	13·43	12·33	11·35
8	21·01	19·70	18·47	17·31*	16·22
10	24·72	23·54	22·40	21·29	20·22
12	27·34	26·28	25·32	24·32	23·35
14	29·27	28·35†	27·47	26·66	25·90
16	30·51	29·75	29·27	28·35†	26·69
Diam. in inches.	**9 ft.**	**9 ft. 6 in.**	**10 ft.**	**10 ft. 6 in.**	**11 ft.**
6	10·50	9·70	9·00	8·35	7·77
8	15·21	14·27	13·40	12·59	11·83
10	19·20	18·23	17·31*	16·43	15·60
12	22·40	21·47	20·57	19·71	18·88
14	24·83	24·16	23·23	22·36	21·56
16	26·86	26·27	25·35	24·66	23·84
Diam. in inches.	**11 ft. 6 in.**	**12 ft.**	**13 ft.**	**14 ft.**	**15 ft.**
7	8·85	8·62	7·63	6·76	6·04
8	10·75	10·50	9·606	8·359	7·505
10	14·38	14·09	12·743	11·55	10·50
12	17·61	17·31*	15·88	14·575	13·393
14	20·34	20·11	18·65	17·31*	16·07
16	22·64	22·36	21·05	19·67	18·46
Diam. in inches.	**16 ft.**	**17 ft.**	**18 ft.**	**19 ft.**	**20 ft.**
7	5·42	4·88	4·42	4·03	3·66
8	6·767	6·12	5·56	5·08	4·65
10	9·84	8·74	8·00	7·36	6·77
12	12·33	11·36	10·49	9·70	9·00
14	14·94	13·90	12·95	12·40	11·25
16	17·31*	16·21	15·19	14·28	13·38

* All same proportion. $D = \frac{1}{11}L$.
† All same proportion. $D = \frac{1}{12}L$.

CONCRETE BUILDING. ('Builder.')

MATERIALS.—Half measure of Portland cement; half measure of air-slaked lime sifted through a fine sieve, mixed together dry.

Seven measures of sand and gravel, if possible of all degrees of fineness, from peas to large eggs, or stones broken to pass through a 2-inch ring; the finer should just fill the intervals of the coarser materials; then all to be mixed together dry and measured. The mixture of cement and lime to be then added and mixed dry, and the whole tempered with as little water as possible; any more than will just moisten the whole is in excess. No wall-plates or timbers should be bedded *in* concrete walls.

CONCRETE under Water. (Crawford.)

The result of a series of experiments, for the purpose of ascertaining the best description of concrete to be placed round the foundations of the river piers (Görlitz, Prussia), gave the proportions most suitable for yielding a quick-setting hard concrete at

22	per cent.	of cement.
22	,,	sand.
56	,,	small broken stones (2 inches in diameter).
100		

A good concrete is made as follows:—

Screened gravel	4⅔
Sharp sand	2⅓
Blue lias lime	1
Total	8 parts,

mixed dry, and just as much water as will moisten the whole added, the whole substance to be then thoroughly mixed and thrown into the trenches whilst hot.

Concrete should be mixed in small quantities at a time and used fresh.

See also page 161 *et seq.*

CORRUGATED IRON

Is usually made in sheets 6 ft. to 8 ft. long, and 2 ft. to 3 ft. wide.

CORRUGATED IRON ROOFING.

B. Wire Gauge.	Size of Sheets.	Weight per square.	Sq. feet per ton.
	feet.	cwt. qr. lb.	
No. 16 ..	6×2 to 8×3	3 0 14	800
,, 18 ..	6×2 to 8×3	2 1 6	1000
,, 20 ..	6×2 to 8×3	1 3 6	1250
,, 22 ..	6×2 to 7×2½	1 2 7	1550
,, 24 ..	6×2 to 7×2½	1 0 24	1880
,, 26 ..	6×2 to 7×2½	1 0 6	2170

Galvanized Corrugated Iron.

Birmingham makers' weights:—

No. 18	..	..	780	sq. feet per ton.
„ 20	..	..	1000	„ „
„ 22	..	..	1250	„ „
„ 24	..	..	1540	„ „

$\frac{1}{10}$th of the weight to be added for lappage.

Sheets should overlap about 6 inches, and be double riveted at joints.

3 lb. of rivets required per square of roofing.

Purlins should be about 6 feet apart.

CUBICAL CONTENTS OF TIMBER in Floors, &c.

A Table showing the number of Cubic Feet contained in one Square of Flooring, Roofing, &c., from 3 in. × 2 in. to 12 in. × 4½ in., the pieces being 1 ft. apart.

Inches.	2.	2½.	3.	3½.	4.	4½.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
3	3 8	4 4	5 0	5 8	6 3	6 10
3½	3 11	4 9	5 6	6 1	6 10	7 5
3½	4 3	5 1	6 0	6 6	7 4	8 0
3¾	4 7	5 5	6 4	7 0	7 11	8 7
4	4 10	5 10	6 8	7 7	8 4	9 2
4¼	5 2	6 2	7 2	8 0	8 11	9 9
4½	5 5	6 6	7 7	8 6	9 5	10 3
4¾	5 9	6 10	8 0	8 11	9 11	10 10
5	6 1	7 3	8 5	9 5	10 5	11 5
5¼	6 4	7 7	8 9	9 11	11 0	12 0
5½	6 8	7 11	9 2	10 4	11 6	12 6
5¾	6 11	8 4	9 7	10 10	12 0	13 1
6	7 3	8 8	10 0	11 4	12 6	13 8
6¼	7 7	9 0	10 5	11 9	13 1	14 3
6½	7 10	9 5	10 10	12 3	13 7	14 10
7	8 5	10 1	11 8	13 2	14 7	16 0
7½	9 1	10 10	12 1	14 1	15 8	17 1
8	9 8	11 6	13 4	14 11	16 8	18 3
8½	10 3	12 3	14 2	15 10	17 9	19 4
9	10 10	13 0	15 0	17 0	18 9	20 6
9½	11 5	13 8	15 10	17 11	19 10	21 8
10	12 1	14 5	16 8	18 10	20 10	22 9
11	13 3	15 10	18 4	20 8	22 11	25 2
12	14 5	17 3	20 0	22 8	25 0	27 5

The upper line and left-hand figures are the dimensions; the ranging figures with the dimensions given is the quantity contained in one square. Plates and braces in quarter partitions to be added, and deductions made for doorways and other openings. An extra joist should be allowed for each room, and extra thickness of trimming joist should be added.

DAMP.

Recipe for Damp Walls.

Take ¾ lb. mottled soap to 1 gallon of water, to be applied *boiling* over the surface with a brush (not to be frothed), leave it for 24 hours to dry; then apply ½ lb. of alum to 4 gallons of water, leaving it for 12 hours to dissolve, and to be laid on as before. Hot weather is best for the application.

DAMP COURSE.

It is usual to form a damp course through all walls at about 3 in. or 6 in. above the ground line. Slate (lapped at the joints) and lead are sometimes used for this purpose; but asphalt ½ in. or ¾ in. thick, or foundation felt (Anderson's or McNeill's), is the most efficacious and most economical.

DECAY OF WOOD. (Baron Liebig.)

Causes of Decay.

1. The oxygen in the atmosphere combines with the hydrogen of the fibre, and the oxygen unites with the portion of carbon of the fibre and evaporates as carbonic acid; this is called *decomposition*.

2. The actual decay of the wood which takes place when it is brought into contact with rotting substances.

3. The inner decomposition of the wood in itself by losing its carbon forming carbonic acid gas, and the fibre under the influence of the latter is changed into white dust, which is called *putrefaction*.

A Synoptical View of the leading Dimensions of the English Cathedrals. (Gwilt.)

Cathedral.	Total internal Length.	Naves and Aisles.			Choirs.			Transepts.	Spires and Towers.	Height.
		Length.	Breadth.	Height.	Length.	Breadth.	Height.	Breadth.		
Winchester ..	545	247	86	78	138	..	73	186	..	..
Ely	517	327	73	70	101	73	70	178	Tower	210
Canterbury ..	514	214	70	80	150	74	80	154	,,	235
York	498	264	109	99	131	..	99	222	,,	234
Lincoln ..	498	..	83	83	..	..	..	227	,,	260
Westminster	489	130	96	101	152	..	151	189	..	..
Peterborough	480	231	78	78	138	..	78	203	Louvre	150
Salisbury ..	452	246	76	84	140	..	84	210	Spire	387
Durham ..	420	..	..	..	117	33	71	176	Tower	214
Gloucester ..	420	174	84	67	140	..	86	144	,,	225
Lichfield ..	411	213	67	..	110	..	67	..	Spire / 25ft W.	183
Norwich ..	411	230	71	..	165	..	..	191	Spire	317
Worcester ..	410	212	78	..	126	..	74	130	Tower	196
Chichester ..	401	205	91	61	100	..	..	131	Spire	267
Exeter	390	173	74	69	131	..	69	140	Tower	130
Wells	371	191	67	67	106	..	67	135	,,	160
Hereford, anct.	370	144	68	68	105	..	64	140	..	..
Rochester ..	306	150	65	..	156	..	..	122	Spire	156
Carlisle.. ..	213	..	71	71	137	71	..	..	..	..
Bristol	175	100	75	73	100	..	..	128	Tower	127
Oxford	154	74	54	41	80	..	37½	102	Spire	184

Dimensions of	Length in feet.	Width in feet.	Height to Ridge in feet.
Westminster Hall, London ..	238	67½	90
Guildhall „ ..	153	50	82
Lincoln's Inn „ ..	120	45	60
Whitehall „ ..	110	55	55
Middle Temple „ ..	100	40	50
Mansion House „ ..	90	50	60
St. Stephen's Hall, Westminster	90	30	60
Hampton Court Palace	106	40	60
Eltham Palace	101	36	54
House of Lords	90	45	45
House of Commons	75	45	41

DRAINAGE OF LAND. (Mr. Dempsey.)

Description of Soils.	Distance of drains apart.	Depth of drains.	Number of drain pipes 12 in. long per acre.	Cost of drain tiles per acre, at 30s. per 1000.
Compact or Heavy Soils.	feet.	ft. in.		£ s. d.
Compact, tenacious, gravelly clay ..	15	2 6	2905	4 7 2
Stiff adhesive clay	16½	2 6	2640	3 19 2
Friable clay	18	2 9	2420	3 12 7
Free soft clay	21	2 9	2076	3 2 3
Medium Soils.				
Clayey loam	22	3 0	1980	3 19 5
Marly loam	24	3 0	1814	2 14 6
Gravelly loam	27	3 3	1613	2 8 4
Friable loam	30	3 3	1452	2 3 6
Porous or Light Soils.				
Light gravelly loam	33	3 6	1320	1 19 7
Light marly loam	36	3 9	1209	1 16 3
Sandy loam	39	4 0	1117	1 13 6
Soft light loam	42	4 0	1037	1 11 2
Sandy soil	45	4 0	974	1 9 3
Light gravelly sand	49½	4 3	880	1 7 5
Deep gravelly sand	55	4 3	792	1 3 9
Coarse gravelly sand	60	4 6	726	1 1 9
Loose gravelly sand	66	4 6	660	0 19 10

DRAINS AND SEWERS

Provide for removing rainfall from

Roofs	·5	in. in depth per hour.	
Flagged areas	·2	„	„ „
Gravelled „	·05	„	„ „

Drains and sewers provide for removing 5 cubic feet per head in every 24 hours, one-half of which passes off in about 5 hours.

House drains require a velocity of 3 feet per second to keep them clear, and 2 feet per second is required for sewers.

RULES FOR DRAINAGE AND SEWERS. (Rawlinson.)

1. Natural streams should not be arched over to form main sewers.

2. Valley lines and natural streams may be improved so as to remove more readily surface water and extreme falls of rain.

3. Main sewers need not be of capacity to contain flood water of the area drained; such flood water may be passed over the surface in most cases without causing injury.

4. Main sewers should be laid out in straight lines and true gradients from point to point, with manholes, flushings, and ventilating arrangements at each principal change of line and gradient. All manholes should be brought up to the surface of the road or street to allow of inspection, and should be finished with a cover easily removable.

5. Duplicate systems of sewers are not required. Drains to natural streams in valley lines for storm waters may be retained, and may be improved, or if necessary enlarged.

6. Earthenware pipes make good sewers and drains up to their capacity. Pipes must be truly laid and securely jointed. In ordinary ground they may be jointed with clay. In sandy ground special means must be used to prevent sand washing in at the joints.

7. Brick sewers ought to be formed with bricks moulded to the radii.

8. Brick sewers should in all cases be set in hydraulic mortar, or in cement. In no case should any sewer be formed with bricks set dry to be subsequently grouted.

9. Main sewers may have flood-water overflows wherever practicable to prevent such sewers being choked during thunderstorms or heavy rains.

10. Sewers should not join at right angles. Tributary sewers should deliver sewerage in the direction of the main flow.

11. Sewers and drains, junctions and curves, should have extra fall to compensate for friction.

12. Sewers of unequal sectional diameters should not join with level inverts, but the lesser or tributary sewer should have a fall into the main at least equal to the difference in the sectional diameter.

13. Earthenware pipes of equal diameters should not be laid as branches or tributaries; that is, 9 in. leading into 9 in., or 6 in. into 6 in., but a lesser pipe should be joined on to the greater, as 6 in. to 9 in., 12 in. to 15 in., 9 in. to 12 in.

14. House drains should not pass direct from sewers to the inside of houses, but all drains should end at an outside wall. House drains, sink pipes, and soil pipes should have means of external ventilation. The largest block of buildings may have every sewer outside of the main walls. No foul water drains nor cesspit should be formed beneath any house basement. All fluid refuse should pass at once from the drains to the sewers and from the sewers to the outlet.

15. Sinks and water-closets should be against external walls, so that the refuse water or soil may be discharged into a drain outside the main wall. Down spouts may be used for ventilation, care being taken that the head of such spout is not near a window. Water-closets, if fixed within houses, and having no means of direct daylight and external air ventilation, are liable to become nuisances and may be injurious to health.

16. Inlets to all pipe drains should be properly protected.

17. Sewers having steep gradients should have full means of ventilation at the highest points.

18. Tall chimneys may be used with advantage for sewers and drain ventilation.

Sewers. (Bazalgette.)

For the metropolitan sewers the bricks used are mostly picked stocks, frequently faced with gault clay bricks, and the inverts are occasionally faced with Staffordshire blue bricks. The brickwork as a rule is laid in blue lias lime mortar, mixed in the proportion of 2 of sand to 1 of lime for two-thirds of the upper circumference

of the sewers, and the lower third in Portland cement in the proportion of 1 part of cement to 1 part of sand.

Flow of Water in Sewer. (Molesworth.)

x = Area of sewer ÷ the wetted perimeter in feet.
f = Fall in feet per mile.
V = Velocity in feet per minute.
A = Area in square feet.
C = Cubic feet of water delivered per minute.

$$V = 55\sqrt{x \times 2f}.$$
$$C = V \times A.$$

Egg-shaped Sewer.—Internal Dimensions.

Let B = Diameter of bottom of sewer.
C = „ top „
R = Radius of sides „
D = Depth of sewer.

$$B = \frac{D}{3}. \qquad C = \frac{2D}{3}. \qquad R = D.$$

When D is less than 6 ft., the brickwork is generally 9 in. thick,
Above 6 ft. and under 9 ft., brickwork 14 in. thick.

DRAINAGE OF TOWNS, COST OF. (Rawlinson.)

	Population.	Cost of Drainage.	Rate in the £.
		£	d.
Alnwick	7,000	4,327	3¾
Berwick	10,000	5,649	2¾
Carlisle	26,000	23,000	4
Lancaster	14,000	9,245	—
Morpeth	4,000	2,270	3¾
Ormskirk	5,000	2,982	3
Tynemouth	29,000	12,000	3¾
Walsop	7,000	5,871	4¼

For present prices 35 per cent. should be added.

DRY ROT, CURE OF. (Gwilt.)

Substitute new timbers for the rotten ones, and clear away every particle of the *fungus* known as *Merulius lacrymans*, both from the adjoining walls and timbers. Afterwards apply some of the washes given for the preservation of timber. Coal tar will effect the same purpose, or a weak solution of vitriolic acid with water will generally stop the rot if it has not gone too far, and pyroligneous acid is recommended for preventing the spread of the rot.

EVAPORATION from water surfaces. (From experiments by Dr. Dalton.)

March	·033 inch per day.
April	·055 „ „
May	·075 „ „
June	·063 „ „
July	·122 „ „
Hottest weather ..	·200 „ „

EXCAVATORS' MEMORANDA.

Natural Slopes of Earths (with Horizontal Line).

	°		°
Compact earth	50	Dry sand	32
Clay, well drained	45	Vegetable earth	28
Rubble	45	Sand	22
Gravel, average	40	Wet clay	16
Shingle	39		

Weight of Earths, Rocks, &c., per Cubic Yard.

	cwt.		cwt.
Slate	about 43	Chalk	about 36
Trap	„ 42	Clay	„ 31
Granite	„ 42	Gravel	„ 30
Quartz	„ 41	Sand	„ 30
Shale	„ 40	Marl	„ 26
Sandstone.	„ 39	Mud	„ 25

In loose ground a man can throw up about 10 cubic yards per day; hard or gravelly soil about 5 cubic yards per day.

Three men will remove 30 cubic yards a distance of 20 yards per day.

20 yards = 1 run.
27 cubic feet = 1 load.
54 „ = 1 double load.

	cubic yards.
A dobbin cart will hold about	$\frac{3}{4}$
A wheelbarrow „ „	$\frac{1}{10}$
An earth waggon „ „	$1\frac{1}{2}$
Ditto, large „ „	3

1 cubic yard of earth contains about 21 striked bushels.
1 cubic yard of gravel contains about 18 striked bushels.

Proportion of Increase of Earth, &c., when Dug.

	Before digging.	When dug.
Earth and clay	1 ..	$1\frac{1}{4}$
Sand and gravel	1 ..	$1\frac{1}{10}$
Chalk	1 ..	$1\frac{1}{3}$

The following quantities will on an average weigh 1 ton :—

	Cubic feet.		Cubic feet.
Sand, river	21	Marl	28
„ pit	22	Clay	28
Thames ballast	22	Night soil	32
Gravel, coarse	23	Earth mould	33
Shingle, clean	24		

FIRE AND INSURANCE, Memoranda of.

1. Brick party walls, besides having no opening therein, must be carried through the slated or tiled roof, otherwise the building will be rated as of the "second class," and be charged the same rate of premium as a *brick and timber* building.

2. Well-holes for light and for staircases, as also for lifts, lined with wood, are considered as increasing the risk from fire.

3. Windows looking into areas common to other buildings also considered to add to the risk.

4. Buildings having a curb or Mansard roof, with rooms in the roof, come under the same denomination as brick and timber buildings, and are rated accordingly.

5. Gratings to public thoroughfares, when they open directly into any room on the basement story, are now regarded as dangerous by all leading Fire Offices, so many fires having recently originated from fusees or pipe-lights dropped through said gratings.

6. The spaces behind register stoves should be filled up solid with brickwork. Many fires are caused by the space behind the stove being left a vacuity, which gets filled with soot from the flue, and, smouldering behind the stove, it ignites plugs or grounds, or other adjacent woodwork.

7. Many fires are caused by want of proper cow-dung pargetting to smoke-flues.

8. Engine, furnace, and bakehouse chimneys should be carried up outside the main walls of the building, and be formed with brickwork independently of those walls.

9. Fire-places in carpenters' shops should have brick fenders 2 ft. 6 in. high, with a lifting or sliding iron shutter to completely enclose fire-place when not in use.

10. Pipe stoves on wood floors to stand on a stone or other hearth constructed of incombustible materials, which must be at least 7 inches thick, measuring from its upper face to the under side which rests on the wood floor.

11. All pipe flues from close stoves to be of *sheet*—not *cast*—iron, and to be fixed 9 inches clear of any woodwork or timbering.

12. All steam or hot-water pipes to be fixed 3 inches clear of any woodwork or timbering.

13. India-rubber tubing to supply gas stoves is liable to melt near its connection with the stove.

14. Metal composition gas-piping is objectionable. Fires have originated from common acts, such as driving a tack into this piping, and many, originally, small accidents from fire have been magnified by the melting of this kind of gas pipe.

15. No extra rate of Fire Insurance is charged if a building is heated by *hot water*, provided the furnace and apparatus be placed in a brick-vaulted chamber. But buildings heated by hot air are considered a greater risk.

16. Contiguity to an inferior structure or to a manufactory brings a first-class insurance within the more hazardous risk if there be either door or window openings overlooking said inferior structure or manufactory.

FIVE ORDERS of ARCHITECTURE.

Height of	Tuscan column	..	7 diameters.
„	Doric „	..	8 „
„	Ionic „	..	9 „
„	Corinthian „	..	10 „
„	Composite „	..	10 „

Scamozzi says it was the common practice of the ancients to make all the entablatures $\frac{1}{4}$th the height of the column.

ENTABLATURE. (Perrault.)

	Whole height divided into	Giving to		
		Architrave.	Frieze.	Cornice.
	parts.			
Tuscan	10	3	3	4
Doric	8	2	3	3
Ionic	10	3	3	4
Corinthian	10	3	3	4
Composite	10	3	3	4

Half the lower diameter of the column is called a *module*, which, being divided into 30 equal parts, are called *minutes*.

Memoranda for proportioning the Five Orders to any given height. (By Palladio, Vignoles, Batty Langley, and others.)

TUSCAN ORDER.

To proportion the Tuscan order with its pedestal to any given height, and to find the diameter of the column,

Let *a b*, Fig. 4, be the given height.

Divide *a b* into 5 parts, giving 1 to the pedestal.
„ *e f* „ 5 „ „ 1 „ entablature.
„ *g h* „ 7 „ „ 1 „ diameter of column.

To proportion the Tuscan order with its subplinth to any given height,

Let *c d*, Fig. 4, be the given height.

Divide *c d* into 8 parts, giving 1 to the subplinth, and divide *e f* and *g h* as before.

DORIC ORDER.

To proportion the Doric order with its pedestal to any given height, and to find the diameter of the column,

Let *c d*, Fig. 7, be the given height.

TUSCAN.

Fig. 4.

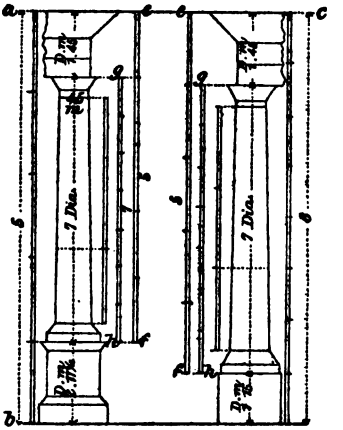
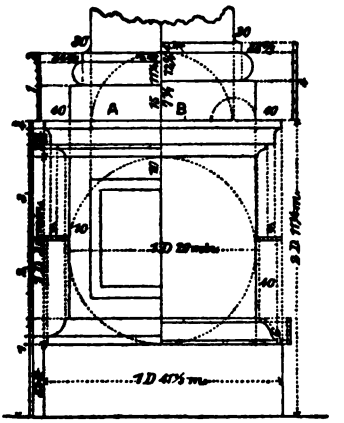
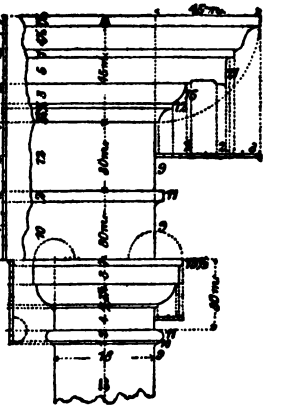


Fig. 5.



Example of Tuscan Base and Pedestal, proportioned by minutes and equal parts.

Fig. 6.



Example of Tuscan Entablature, proportioned by minutes and equal parts.

DORIC.

Fig. 7.

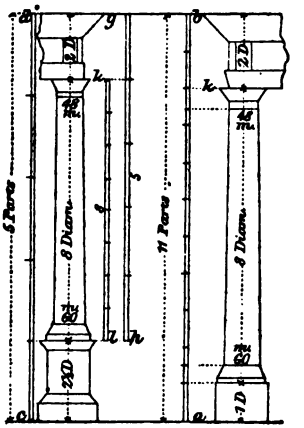
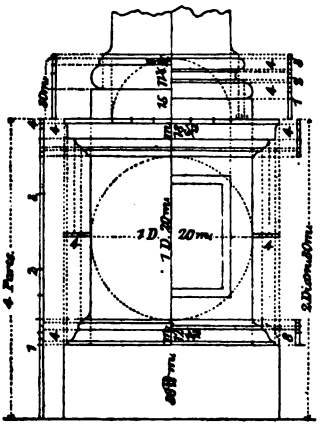


Fig. 8.



Example of Doric Pedestal and Base, proportioned by minutes and equal parts.

Divide *c d* into 5 parts, giving 1 to the pedestal.
„ *g h* „ 5 „ „ 1 „ entablature.
„ *k l* „ 8 „ „ 1 „ diameter of column.

To proportion the Doric order with its subplinth to any given height, and to find the diameter of the column,

Let *a b*, Fig. 7, be the given height.

Divide *a b* into 11 parts, giving { 1 to the subplinth. 2 „ entablature. 8 „ column.

Fig. 9.

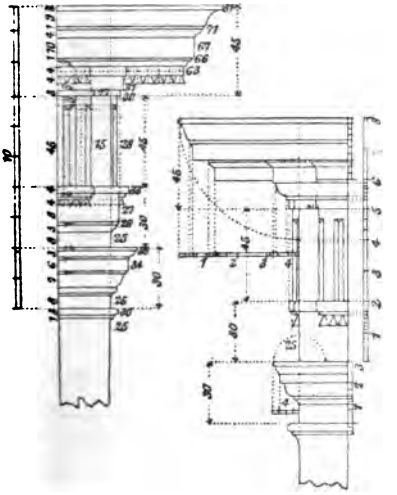
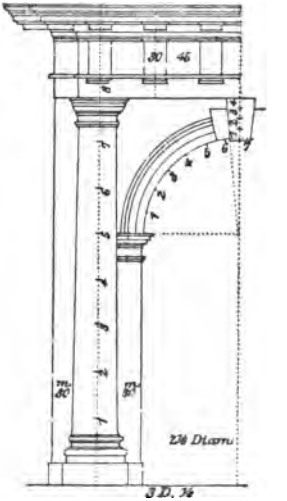


Fig. 10.



Examples of Doric Entablature and Capital, proportioned by minutes and equal parts.

Ionic Order.

To proportion the Ionic order with its pedestal to any given height, and to find the diameter of the column,

Let *c d*, Fig. 11, be the given height.

Divide *c d* into 5 parts, giving 1 to the pedestal.
„ *e f* „ 6 „ „ 1 „ entablature.
„ *g h* „ 9 „ „ 1 „ diameter of column *k l*.

IONIC.

Fig. 11.

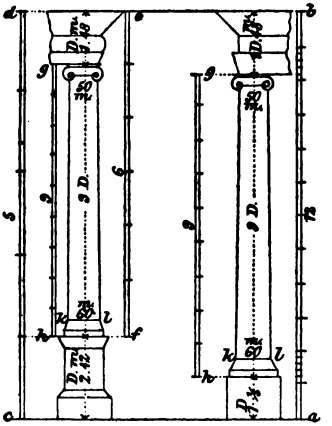
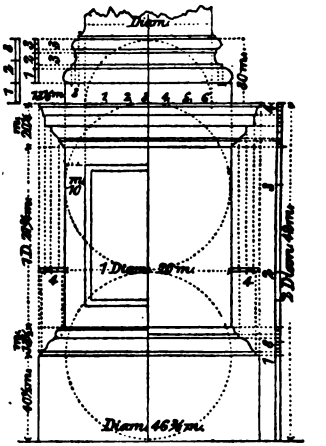
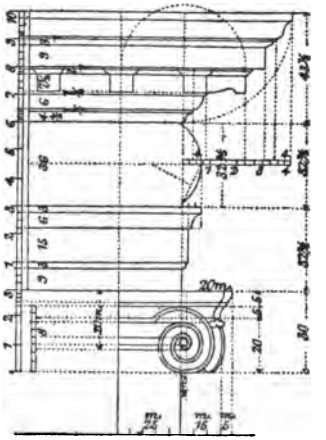


Fig. 12.



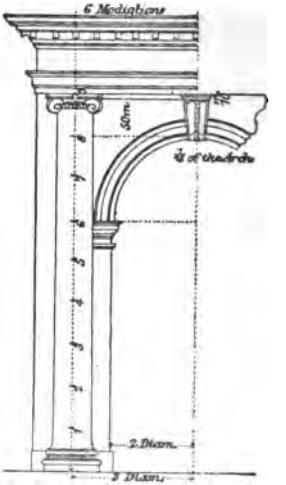
Example of Ionic Pedestal and Base, proportioned by minutes and parts.

Fig. 13.



Example of Ionic Entablature and Capital, proportioned by minutes and equal parts.

Fig. 14.



To proportion the Ionic order with its subplinth to any given height, and to find the diameter of the column,

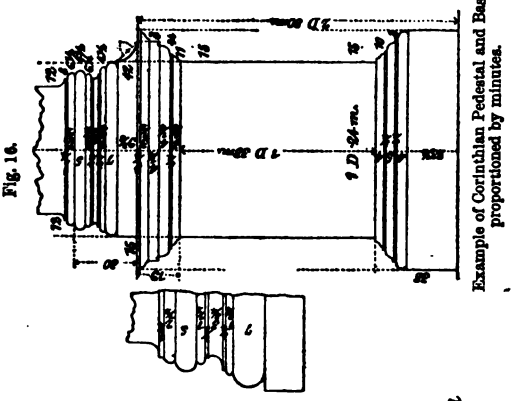
Let *a b*, Fig. 11, be the given height.

Divide *a b* into 12 parts, giving { 1½ to subplinth. 1½ to entablature.

Divide *e f*, &c., as before.

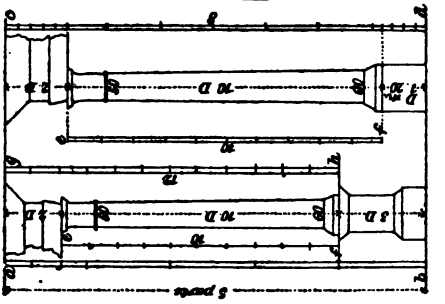
CORINTHIAN ORDER.

Fig. 14.



Example of Corinthian Pedestal and Base, proportioned by minutes.

Fig. 15.



To proportion the Corinthian order with its pedestal to any given height, and to find the diameter of the column,

Let *a b*, Fig. 15, be the given height.

Divide $a\,b$ into 5 parts, giving 1 to the pedestal.

Divide $g\,h$ into 12 parts, giving { 10 to the column. 2 „ entablature. 1 „ diameter of column.

Fig. 17.

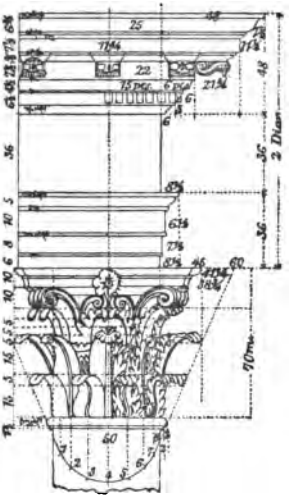
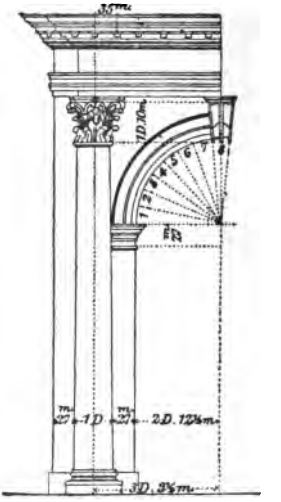


Fig. 18.



Example of Corinthian Entablature and Capital, proportioned by minutes.

To proportion the Corinthian order with its subplinth to any given height, and to find the diameter of the column,

Let $c\,d$, Fig. 15, be the given height.

Divide $c\,d$ into 8 parts, giving { $\frac{1}{8}$ths to the subplinth, and $1\frac{1}{8}$th to the entablature.

Divide $g\,h$, &c., as before.

Composite Order.

Proportioned in the same way as the Corinthian.

EARLY GREEK BUILDINGS.

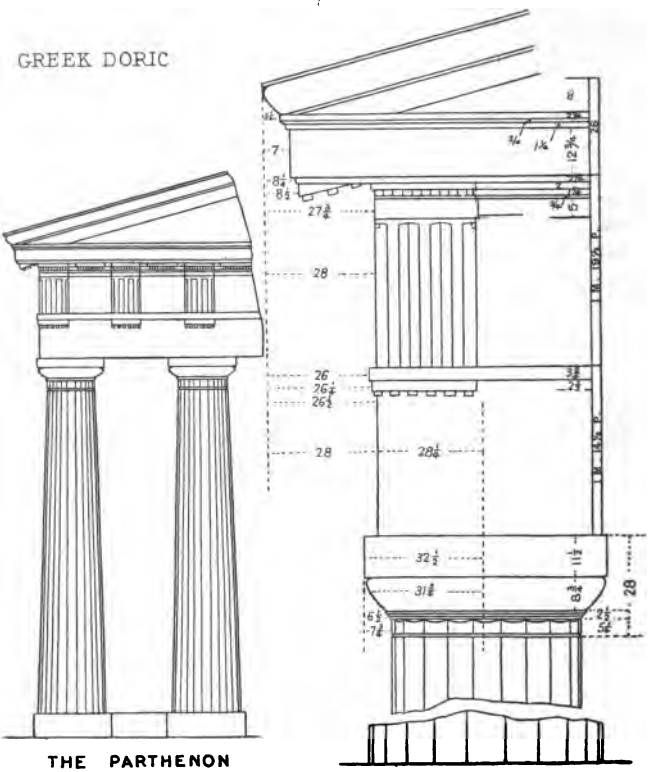
Propylæum, commenced by Mnesicles about 437 B.C., and was completed in five years.

Parthenon, erected a few years later, under the direction of Ictinus, is one of the finest remains of antiquity. The sculpture was superintended by Phidias.

Comparison between Greek Doric and Roman Doric.

Greek Doric.	*Roman Doric.*
No base.	Had base.
Column fluted.	Column unfluted.
Plain square abacus.	Abacus moulded with fillet and ogee on top edge.
Deep architrave.	Shallow architrave.
Elliptical-headed flutes in triglyphs.	Square-headed flutes in triglyphs.
No pedestal.	Order placed on a pedestal.
The Greeks made the contours of their mouldings a portion of a conic section.	The Romans made the contours of their mouldings a portion of a circle.
The Greeks did not use arches.	The Romans used arches.

To face p. 44.



THE PARTHENON

	COLUMN DIAMETERS IN HEIGHT	ENTABLATURE IN TERMS OF DIAMETER	HEIGHT OF CAPITAL IN TERMS OF DIAMETER
Hypaethral Temple at Paestum	4·134	1·741	·549
Parthenon	5·566	1·977	·459
Temple of Jupitor Nemeus	6·515	1·560	·383

COMPARISON OF GREEK AND ROMAN ORDERS. (Gwilt.)

	Column. Diameters in height.	Entablature in terms of diameter.	Height of Capital in terms of diameter.	Upper diameter of Shaft.
GREEK.				
DORIC.				
Parthenon	5·56	1·97	0·459	—
Temple of Corinth..	4·06	—	0·405	—
IONIC.				
Temple of Ilyssus ..	8·24	2·65	0·61	0·85
„ Erectheus	9·33	—	0·77	0·81
CORINTHIAN.				
Choragic monument of Lysicrates ..	10·38	2·16	1·21	0·83
ROMAN.				
DORIC.				
Marcellus (Theatre)	7·86	¼ whole height of order.	—	—
IONIC.				
Coliseum	8·84	2·28	0·46	0·83
Temple of Fortuna Virilis	8·79	2·18	0·45	0·87
CORINTHIAN.				
Pantheon	9·80	2·31	1·17	0·85
Jupiter Tonans ..	10·24	2·06	1·16	0·86

The lower diameter of the column being reckoned 1·000.

FIVE ORDERS OF ARCHITECTURE.

When Intercolumniations are—

1½	times lower diameter of columns		they are called	*pycnostyle.*
2	„	„	„	*systyle.*
3½	„	„	„	*eustyle.*
3	„	„	„	*deccastyle.*
4	„	„	„	*arœostyle.*

When porticos consist of 4 columns with 3 intercolumniations, they are called *tetrastyle;* with 6 columns, *hexastyle;* with 8 columns, *octastyle.*

FLINT WALLS

Should be built slowly and solidly with a stiff strong mortar, compounded of quick-setting lime and coarse sharp sand. Flint walls must be kept dry during their erection as well as subsequently.

FLOORS OF TIMBER. (Tredgold.)

L = Length in feet.
B = Breadth in inches.
D = Depth in inches.

Girders. (Not exceeding 10 feet apart.)

To find the depth:—

Divide the square of the length in feet by the breadth in inches; and the cube root of the quotient multiplied by 4·2 for fir, or by 4·3 for oak, will give the depth in inches.

To find the breadth:—

Divide the square of the length in feet by the cube of the depth in inches; and the quotient multiplied by 74 for fir, or by 82 for oak, will give the breadth in inches.

Binding Joists. (6 ft. apart.)

$$D = \sqrt[3]{\frac{L^2}{B}} \times 3{\cdot}42 \text{ for fir, or } 3{\cdot}53 \text{ for oak.}$$

$$B = \frac{L^2}{D^3} \times 40 \text{ for fir, or } 44 \text{ for oak.}$$

Or to find the depth:—

Divide the square of the length in feet by the breadth in inches; and the cube root of the quotient multiplied by 3·42 for fir, or by 3·53 for oak, will give the depth in inches.

To find the breadth:—

Divide the square of the length in feet by the cube of the depth in inches; and multiply the quotient by 40 for fir, or by 44 for oak, will give the breadth in inches.

Single Joists. (12 in. from centre to centre.)

$$D = \sqrt[3]{\frac{L^2}{B}} \times 2{\cdot}2 \text{ for fir, or } 2{\cdot}3 \text{ for oak.}$$

Or to find the depth:—

Divide the square of the length in feet by the breadth in inches; and the cube root of the quotient multiplied by 2·2 for fir, or by 2·3 for oak, will give the depth in inches.

Ceiling Joists. (12 in. from centre to centre.)

$$D = \frac{L}{\sqrt[3]{B}} \times 0{\cdot}64 \text{ for fir, or } 0{\cdot}67 \text{ for oak,}$$

or ½ in. deep for every foot in length of bearing, and 2 in. broad.

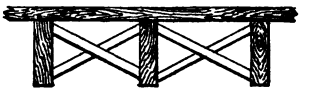
Or to find the depth:—

Divide the length in feet by the cube root of the breadth in inches; and multiply the quotient by 0·64 for fir, or by 0·67 for oak, will give the depth in inches.

SINGLE JOISTED FLOORS.

(With herring-bone strutting; struts 2 in. × 2 in.)

Fig. 19.



DOUBLE FLOORS.

A Floor boards.
B Floor joists.
C C Binders.
D Ceiling joists.
E E Girders.

Fig. 20.

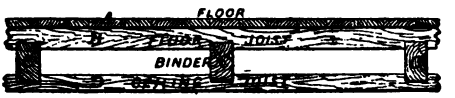


Fig. 21.

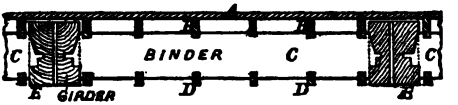


TABLE OF WOOD JOISTS, FLOORING, &c., IN BALTIC FIR. (Tredgold.)

Length of bearing in feet.	Girders. 10 feet apart.		Binders. 4 to 6 feet apart.		Joists. 1 foot apart.		Ceiling Joists. 1 foot apart.	
	Depth in ins.	Breadth in ins.	Depth in ins.	Breadth in ins.	Depth in ins.	Breadth in ins.	Depth in ins.	Breadth in ins.
6	—	—	7	4	6	2	3½	2
8	—	—	8	5½	7	2½	4	2½
10	10	7½	9	5½	7½	2½	5	2½
12	11	8	10	6	8½	2½	6	2½
14	12	8	10	8	9½	2½	—	—
16	12½	10	11	8	10½	2½	—	—
18	13	11	12	7½	12	2½	—	—
20	14	11	—	—	12	3	—	—
24	16	11	—	—	—	—	—	—
26	16	13	—	—	—	—	—	—

When the bearing of the joists exceeds 8 feet, the joists should be strutted with a row of struts for each 4 feet of bearing extra.

For trimming joists, add $\frac{1}{8}$ of an inch in breadth to the size over that of ordinary joists for each joist supported by the trimmer.

Weight which floors have to carry :—

	per ft. sup.
Workshops and public halls	$1\frac{1}{2}$ cwt.
Heavy goods stores, and factories	$2\frac{1}{2}$,,
Ordinary dwelling-houses	$1\frac{3}{8}$,,

Fig. 22.

When a timber is laid over several points of support, as in sketch, the strength of the intermediate parts is about twice as much as when cut into short lengths: hence the advantage of using rafters, bridging joists, purlins, &c., in long lengths.

Safe Loads.

Timber is permanently injured if more than $\frac{1}{4}$ the breaking weight is placed upon it.

FOOTINGS OF WALLS.

The projection of the bottom of the footing of every wall, on each side of the wall, should be at least equal to one-half of the thickness of the wall at its base; and the diminution of the footing of every wall should be formed in regular offsets, and the height from the bottom of such footing to the base of the wall should be at the least equal to one-half of the thickness of the wall at its base.

GASFITTERS' WORK, Memoranda of.

Wrought-iron welded tubing for gas supply is made from 2 in., $1\frac{1}{2}$ in., $1\frac{1}{4}$ in., 1 in., $\frac{3}{4}$ in., $\frac{1}{2}$ in., $\frac{3}{8}$ in., $\frac{1}{4}$ in., and $\frac{1}{8}$ in. diameter, in lengths from 4 to 12 feet, from 2 feet to 4 feet, and shorter pieces under 2 feet, with connecting pieces, elbows, bends, cocks, taps, screws, &c., to each of the above sizes.

The Metropolitan Fire Brigade say that no gas bracket should be placed nearer to a ceiling than 36 inches, and at that distance should be protected by a hanging shade.

Tin and composition gas piping has been the cause of many fires. Wrought-iron welded tubing should be used.

No gas pipe should be let into the plastering.

Copper pipes should not be used, as after a time a detonating substance is formed in the pipe by the action of the gas on the metal.

WEIGHT OF GAS TUBING.

Diameter.	Weight per 100 feet.
¼ inch	28 lbs.
⅜ „	41 „
½ „	60½ „
¾ „	87 „
⅞ „	117 „
1 „	179 „
1¼ „	252 „
1½ „	297 „
2 „	448 „

GAS.

For private Gas Works, bones, oil, grease, peat, and wood are used for distilling gas, but where coal does not exceed 80*s.* per ton, it is cheapest.

INTERCEPTION OF LIGHT BY GAS AND OTHER GLASSES.

Common window glass intercepts light	8 to 10 per cent.
Ground glass	„ „ 26 „ 31 „
Clean glass globe	„ „ 10 „ 12 „
Common figured globe	„ „ 23 „ 25 „
Ground globe	„ „ 28 „ 33 „
Opal shade	„ „ 54 „ 58 „
Ditto, painted	„ „ 63 „

RELATIVE PRICES OF ARTIFICIAL LIGHT.

(Assuming Gas to be 5*s.* per 1000.)

	s.	*d.*	
Gas	0	7½	For equal quantities of light.
Sperm Candles	13	0	
Wax	11	9	
Dips (tallow)	3	6	

Light decreases in the ratio of the square of its distance from its source.

GAS SUPPLY.

Internal lights require about 4 cubic feet of gas per hour.
External „ „ 5 „ „ „
Argand burners from 6 to 10 „ „ „
Lamps consume about 21,000 cubic feet per year.
Private burners „ 5,000 „ „

SUPPLY OF GAS THROUGH PIPES.

$$Q = 1000 \sqrt{\frac{D^5 H}{S L}}.$$

Q = Quantity of gas in cubic feet per hour.
D = Diameter of pipe in inches.
H = Head of water pressure in inches.
S = Specific gravity of gas.
L = Length of pipe in yards.
H may be taken = 1 inch to ¼ inch.
G = 45

TABLES OF THE SUPPLY OF GAS THROUGH PIPES IN CUBIC FEET PER HOUR.
(Length of Pipe = 10 yards.)

Diameter of Pipe in inches.	Supply of Gas in cubic feet per hour. (Approximately.)							
	Pressure by the Water-Gauge in inches.							
	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{3}{10}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	2
$\frac{3}{8}$	10	15	20	25	35	40	—	—
$\frac{1}{2}$	20	30	40	50	70	80	—	—
$\frac{3}{4}$	60	85	105	135	190	210	—	—
1	120	180	240	300	380	430	—	—
$1\frac{1}{4}$	230	300	370	540	680	800	—	—
$1\frac{1}{2}$	350	500	650	800	1000	1200	—	—
2	700	1000	1300	1600	2000	2500	—	—
Length of Pipe = 100 yards.								
$\frac{3}{4}$	20	30	40	50	60	70	85	100
1	47	60	80	100	120	140	175	200
$1\frac{1}{4}$	120	175	210	275	330	400	500	575
2	—	—	—	580	725	830	1025	1175
$2\frac{1}{2}$	—	—	—	1020	1260	1450	1780	2050
3	—	—	—	1620	1980	2300	2820	3250

GIRDERS.

STRENGTH OF WOOD GIRDERS OR BEAMS.

Rule to find the breaking weight in the middle for girders of wood supported at both ends:—

Multiply the breadth in inches by the square of the depth in inches, and divide by the length of bearing in feet, and multiply the result by 3 for Riga fir, or by 4 for red pine, or by 5 for English oak = to breaking weight in middle in cwt.

Example.—To find the breaking weight in the middle of a beam of Riga fir 6 inches broad, 10 inches deep, and 10 feet bearing:—

$$\frac{6 \times 10^2}{10} = \frac{600}{10} = 60 \times 3 = 180, \text{ the B. W. } m \text{ in cwt.}$$

For a permanently *distributed* load the breaking weight will be double the breaking weight in the middle.

According to Tredgold, the safe load should not exceed $\frac{1}{5}$th the breaking weight.

Thus, taking 180 cwt. for the breaking weight in the middle, the safe load permanently distributed will be

$$\frac{180 \times 2}{5} = \frac{360}{5} = 72 \text{ cwt.}$$

The usual formula is

$$w = s \frac{b d^2}{l}.$$

w = Breaking weight in the middle in cwt.
b = Breadth in inches.
d = Depth in inches.
l = Length in feet.

Value of s according to Barlow.

$s = 6$ for English ash.
$= 5$ „ „ oak.
$= 4\frac{1}{3}$ „ Dantzic oak.
$= 5$ „ Pitch pine.
$= 4$ „ Red pine.
$= 3$ „ Riga fir.

When girders exceed 22 feet in length, it is usual and necessary to strengthen them. This is done in two ways, viz., by trussing and flitches. Little gain is effected in strength by trussing, as will be seen by the following experiments by Barlow; and the value of flitches will be seen from the following table of experiments made at the Royal Arsenal, Woolwich. See page 52.

The usual method of trussing a girder is shown in Figs. 23 and 24.

Fig. 23.

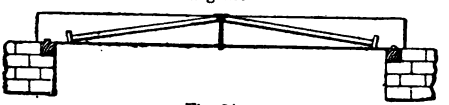
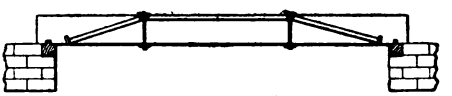


Fig. 24.



TRUSSED GIRDERS. (Barlow.)

Description.	Length of Bearing.	Weight.	Deflection.
	ft. in.	lb.	in.
Two oak trusses meeting against king bolt in centre, with plate bolts at abutments, scantling 2 in. deep × 1⅛ in. broad ..	4 2	600	0·87
Similar, without trusses ..	4 2	600	1·00
Three trusses with 2 queen bolts, and plate bolts at abutments	5 8	500	2·25
Similar, without trusses ..	5 8	500	1·55

EXAMPLES OF EXPERIMENTS MADE AT ROYAL ARSENAL, WOOLWICH.

Description of Girder. 18 feet long—Supports 17 feet apart.	Load.	Deflection. At Middle.	Deflection. At 4 ft. 3 in. from middle	
	lb.	inches.	inches.	
Two Memel deals 9 × 3, laid side by side, and load distributed	6,534	1·3	1·1	Broke in middle with 13,102 lb.
Ditto, loaded in middle	6,166	3·5	2·7	Ditto, 6,800 lb.
Two 9 × 3 deals as above, bolted together with 12 ¾ wrought-iron bolts—load distributed	6,466	1·6	1·2	Ditto, 13,503 lb.
Two 9 × 3 deals as above, with 9 × ⅜ wrought-iron plate in middle, bolted with 11 ¾-in. bolts —load distributed	9,293	1·0	0·7	Ditto, 34,862 lb.
Ditto, ditto..	16,617	1·7	1·3	
Ditto, load in middle	7,148	1·0	0·7	
Ditto, ditto	16,491	3·5	2·5	Ditto, 18,079 lb.
Ditto, with wrought-iron flitch only 9 ft. 3 in. long—load distributed	9,568	1·5	1·2	Broke with 21,566 lb.
Ditto, ditto..	14,699	2·2	2·0	
Ditto, load in middle	9,012	2·0	1·5	Ditto, 14,873 lb.
Ditto, ditto	14,873	broke		
Rectangular beam of 12 × 9 Baltic fir—load distributed	5,503	0·5	0·3	Broke with 27,076 lb. in 2 places near middle.
Ditto, ditto	9,147	1·0	0·7	
Ditto, ditto	19,690	2·0	1·5	
Ditto, scantling, 9 × 6	5,836	1·5	1·2	Ditto, 11,879 lb.
Ditto, ditto	8,645	2·6	2·0	

GIRDERS OF WOOD, WITH WROUGHT-IRON FLITCHES.

To find the breaking weight in cwt. in the middle.

Rule.—For oak add 4 times } the breadth* of the girder in inches
„ fir „ 3 „ } to 30 times the thickness of the wrought-iron flitch in inches, and multiply the result by the square of the depth in inches, and divide by the length of bearing in feet, will give the breaking weight in cwt. in the middle. (The proportion for thickness of flitch given below should be observed.)

Formula for oak:

$$\text{B. W. } m = \frac{D^2}{L}(4\,B + 30\,t).$$

For fir:

$$\text{B. W. } m = \frac{D^2}{L}(3\,B + 30\,t).$$

*B = Breadth of wood in inches.
D = Depth „ „
L = Length of bearing in feet.
t = Thickness of wrought-iron flitch in inches.
B. W. m = Breaking weight in cwt. in middle.

* In taking the breadth, the thickness of the flitch should be included.

For an equally distributed load, take twice the B. W. *m*.

Safe load, $\frac{1}{6}$th.

Thickness of wrought-iron flitch should be from $\frac{1}{10}$th to $\frac{1}{15}$th the thickness of the wood.

Girders of Cast Iron.

To find the breaking weight in the middle in tons.

Rule.—Multiply the area of bottom flange in inches by *twice* the depth in inches, and divide by the length of bearing in feet. The result will give the breaking weight in tons in the middle.

$$\frac{A \times 2D}{L} = \text{B. W. } m \text{ in tons.}$$

A = Area of bottom flange in inches.
D = Depth of girder in inches.
L = Length of bearing in feet.
B. W. *m* = Breaking weight in tons in the middle.

Another rule (Hodgkinson):

$$\frac{A \text{ in inches} \times D \text{ in inches} \times 26}{l \text{ in inches}} = \text{B. W. } m \text{ in tons.}$$

If the load is distributed over the length of the girder, it will be = twice B. W. *m*.

Safe load, $\frac{1}{6}$th.

Cast-iron Girders.

Table of Breaking Weight and Deflection.

Size of Girder.				Length of Bearing.	Breaking Weight in tons.	Permanent Deflection when Tested.
Total Depth.	Bottom Flange.	Top Flange.	Thickness of Web.			
in.	in. in.	in. in.	ft.	ft.		
18	12 × 1½	6½×1½	1½	15	45	Tested with 20 tons in centre, deflection 0·09 in.
16	13½× 1⅛	8×1½	1½	23	54·3	Tested with 30 tons in centre, deflection 0·68 in.
24	18 × 2	10×1½	1½	30	60	Tested with 30 tons in centre, deflection 0·51 in.
24	18 × 2	7×1⅝	1½	30	60	Tested with 30 tons in centre, deflection 0·90 in.

Girders of Wrought Iron.

To find the breaking weight in tons in the middle, both ends of girder supported,

For rolled girders, multiply 7 times
" box " " 6½ " } the depth
" I " " 6 "
" T " " 4 "

of girder by the area of bottom flange (including the angle irons), and divide by length of bearing in feet. The result will give the B. W. m in tons.

The area of the bottom flange includes the web to $\frac{1}{4}$th the depth of girder, or the part below $a\ b$.

Example of a plate girder for a span of 30 feet. (Fairbairn.)

Girder, 31 ft. 6 in. long.
Plates, 22 in. deep × $\frac{5}{16}$th in. thick.
Angle iron, 3 in. × 3 in. × $\frac{1}{2}$ in. at the bottom.
" 4 in. × 4 in. × $\frac{1}{2}$ in. at the top.
The B. W. m, taking the constant at 75, is

$$\frac{\text{A in inches} \times \text{D in inches} \times C}{\text{L in inches}} = \text{B. W. } m,$$

or

$$\frac{6 \times 22 \times 75}{360} = 27{\cdot}5 \text{ tons},$$

the B. W. m, or 55 tons, distributed equally over the length.

Safe load for wrought-iron girder, $\frac{1}{4}$th.

Patent Rolled Iron Joists and Girders.

Table of Safe Load in Tons Distributed.

Section.		Total Depth in in.	Width of Flanges in in.	Top Plate in in.	Weight per foot in lb.	Width of Bearings. 7 Feet.	10 Feet.	13 Feet.	16 Feet.	20 Feet.	25 Feet.
A*	R I joist	4	—	—	6	2·1	1·4	1·1	·847	·641	—
	"	5½	2½	—	9	3·2	2·1	1·6	1·2	·900	—
	"	7	3⅝	—	13	7·1	4·7	3·5	2·8	2·1	—
	"	9½	—	—	24	13·2	8·8	6·6	5·2	4·4	3·4
B*	Girder..	7½	2⅜	4×½	20	14·3	9·5	7·1	5·7	4·3	3
	" ..	9½	2⅜	6×½	29	20	13	9·7	7·7	6·3	4
	..	10½	4⅜	6×½	44	41	27	20	16	13	9½
		9½	4½	9×½	70	—	36	27	20	14	11
		L.	4⅜	12×½	95	—	56	41	30	22	17
		$t = \frac{1}{4}$									ft. lost
		B. W. m = Brt		12×½	160	—	—	68	66	50	Span 26 = 38
											" 30 = 36

* In taking the bre[illegible]

[illegible]tions A, B, C, and D, on following page.

Fig. 25. Fig. 26. Fig. 27.

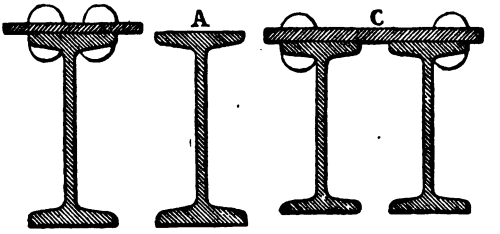
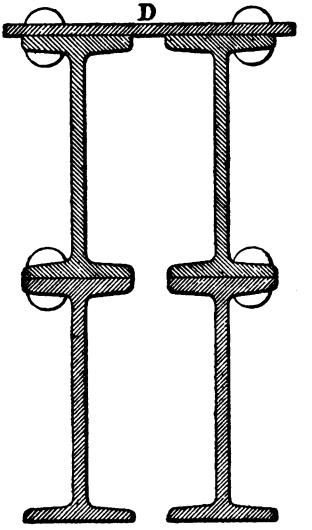


Fig. 28.



A TABLE showing the estimated safe permanent distributed LOADS, in Tons, for various Rolled Steel Joists.

Sectional Dimensions.	Weight per foot.	Position of Load.	Distances between Supports.											
			6 ft.	8 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.	26 ft.	28 ft.	30 ft.
12 × 5 × 5 ..	44	Centre	21 9/10	16 3/10	12 18/20	10 17/20	9 5/10	8 3/10	7 4/10	6 19/20	6	5 1/10	—	—	—
12 × 5 × 5 ..	,,	Uniformly distributed.	36	27	21 12/20	18	15 9/10	13 19/20	12	10 18/20	9 1/10	9	8 3/10	7 7/10	6 19/20
10 × 5 × 5 ..	36		27 1/10	20 1/2	19 3/10	13 1/10	12	10 1/10	9 1/10	8	7 3/10	6 1/10	5 1/10	5	4 1/10
8 × 5 × 5 ..	32		18 1/10	13 1/5	11	9 9/10	7 1/2	6 1/5	6	5 2/10	5	4 1/2	4 1/10	3 1/2	3 1/10
8 × 4½ × 4½..	30		18 1/10	12 2/10	10	8 1/5	7 3/10	6	5 1/10	4 1/2	4 1/10	4	3 7/10	3 1/2	3 1/10
7 × 4 × 4 ..	24		13	9 1/5	7 1/2	6 1/10	5 1/2	4 1/2	4	3 1/2	3 1/10	3	2 1/2	2	1 1/2
6½ × 3½ × 3½..	18		8 1/2	6 1/2	5 1/2	4 1/10	3 1/2	3	2 1/2	2 1/10	2	1 1/2	1 1/2	1 1/2	1 7/10
4½ × 3½ × 3 ..	14		4 2/10	3 2/10	2 1/2	2 1/10	1 1/2	1 1/2	1 1/10	1	1	1	1	1	1
8 × 2½ × 2½..	20		11	8 1/2	6 1/2	5 1/10	4 1/2	4	3 1/2	3 1/10	3	2 1/2	2	1 1/2	1 1/2
7 × 2½ × 2½..	18		9 2/10	6 1/2	5 1/2	4 1/2	4	3 1/2	3	2 1/2	2 1/10	2	1 1/2	1 1/2	1 1/2
6½ × 2 × 2 ..	13		5 1/2	4	3 1/2	2 1/2	2	2	1 1/2	1 1/2	1 1/10	1	1	1	1
5 × 2 × 2 ..	10		3 7/10	2 1/10	2	1 1/2	1 1/10	1	1	1	1	1	1	1	1
4 × 1¾ × 1¾..	8		2 1/2	1 1/2	1 1/10	1	1	1	1	1	1	1	1	1	1
Temporary Deflection			9/16"	1/2"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"

The above loads, being within the limit of elasticity of the girders, do not give a permanent set, but any material increase of the load would do so. If it is desired to keep the girders perfectly straight, or if they are to be subject to sudden shocks, the loads should be less than are here indicated.

STEEL RIVETED GIRDERS AND JOISTS.

TABLE OF SAFE, EQUALLY-DISTRIBUTED LOADS IN TONS FOR CLEAR SPANS IN FEET.

Dimensions. Depth.	Dimensions. Width.	Average Weight per foot run in lbs.	12 feet.	18 feet.	22 feet.	26 feet.	30 feet	34 feet.	40 feet.	44 feet.	50 feet.
in.	in.	lbs.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.
12	× 7½	70	33·2	22·1	18·1	15·3	..	..	..	..	..
15	× 7½	73	43·1	28·7	23·5	19·9	17·2	..	..	..	..
18	× 7½	76	53·0	35·3	28·9	24·4	21·3	18·7	15·9	..	..
12	× 12½	96	48·7	32·5	26·6	22·5	..	..	..	..	..
15	× 12½	99	63·4	42·3	34·5	29·2	25·3	..	..	..	..
18	× 12½	102	78·0	52·0	42·5	36·0	31·2	27·5	..	..	..
24	× 12½	121	..	71·5	58·4	49·5	42·9	37·8	32·1	29·2	25·7
12	× 12	123	64·8	43·2	35·4	29·9	..	..	..	..	..
18	× 12	129	103·3	68·8	56·4	47·7	41·3	36·4	..	..	..
24	× 12	141	..	94·0	77·0	65·0	56·3	49·7	42·2	38·5	33·8
12	× 18	158	77·6	51·1	42·3	36·0	..	..	..	..	..
18	× 18	170	123·1	82·0	67·1	56·8	49·2	43·4	..	..	..
24	× 18	191	..	112·4	92·0	78·0	67·4	59·5	50·5	46·0	40·4
24	× 24	..	..	380·0	311·0	263·0	228·0	201·0	171·0	155·0	137·0
36	× 24	..	..	561·0	459·0	388·0	336·0	296·0	252·0	229·0	204·0

TABLE OF SAFE, EQUALLY-DISTRIBUTED LOADS IN TONS FOR CLEAR SPANS IN FEET—*continued.*

Joists.

Dimensions. Depth.	Dimensions. Width.	Average Weight per foot run in lbs.	4 feet.	6 feet.	8 feet.	10 feet.	12 feet.	14 feet.	16 feet.	18 feet.	20 feet.	22 feet.	24 feet.	26 feet.
in.	in.	lbs.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.
3	× 3	10	3·7	2·7	1·9	1·5	..	..	..	..	..	..	..	..
4	× 1½	7	3·7	2·4	1·8	1·4	1·3	..	..	..	..	..	..	..
5	× 3	14	11·0	5·9	5·0	3·6	2·9	2·6	2·1	..	..	..	..	..
6	× 3	17	14·5	9·3	7·2	5·8	4·7	3·9	3.6	3·2	2·9	..	..	..
8	× 4	22	..	19·0	14·2	11·3	9·5	8·1	7·1	6·2	5·6	5·2	..	..
8	× 6	35	..	27·0	20·3	16·2	13·5	11·6	10·1	9·0	8·2	7·3	6·7	6·2
10	× 4½	32	..	..	23·5	18·8	15·6	13·5	11·7	10·5	9·4	8·5	7·8	7·2
10	× 6	56	..	..	34·8	27·5	23·2	19 5	17·4	15·2	13·7	12·4	11·7	11·1
12	× 6	56	..	..	47·5	37·8	31·7	27·1	23·7	21·0	18·9	17·2	15·8	14·6
14	× 6	60	..	..	..	44·0	36·8	31·8	27·5	24·4	22·0	20·0	18·4	16·9
16	× 6	63	..	..	..	..	44·6	38·2	34·0	29·8	26·5	24·3	22·3	20·6

Dorman, Long & Co.'s prices delivered in London:—

	£ s.		£ s.	
Steel Rolled Joists	from 6 10	to	8 0	per ton.
„ (plate) Riveted Girders	„ 11 0	„	13 0	„
„ (box) „ „	„ 11 10	„	13 0	„

Prices vary according to quantity.

Wrought-iron Girders. (Stephenson's Rule.)

A = Area of bottom flange in inches.
D = Depth of girder in inches.
S = Span in inches.
W = Breaking weight in tons.

For girders supported at both ends and loaded in centre,

$$W = \frac{80\,A\,D}{S}.$$

For girders supported at both ends, load distributed,

$$W = \frac{160\,A\,D}{S}.$$

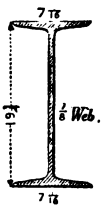
Area of top flange = $1\frac{1}{8}$ A.

Depth = $\frac{S}{12}$ to $\frac{S}{13}$.

In compression, iron may be strained to 4 tons per square inch.
In tension, iron may be strained to 5 tons per square inch.

Table of the Safe Load, one-fifth of breaking weight, uniformly distributed over its length, between supporters at the following distance:—

Fig. 29.



Length of Girder.	Safe Load. ⅕th of breaking weight.	Deflection in Centre.
20 feet.	53,620 lb.	$\frac{5}{16}$ inch.
23 ,,	45,960 ,,	$\frac{5}{16}$,,
26 ,,	40,218 ,,	$\frac{5}{16}$,,
30 ,,	35,745 ,,	$\frac{5}{16}$,,
33 ,,	32,170 ,,	$\frac{1}{3}$,,
36 ,,	29,250 ,,	$\frac{5}{16}$,,
40 ,,	26,810 ,,	$\frac{11}{16}$,,

101¼ *lb. per foot.*

HEAT.

Conducting Power of Various Materials, Slate being 1000.

Slate	1000	Fire-brick	620
Lead	5210	Asphalte	451
Flagstone	1110	Oak	336
Portland stone	750	Lath and plaster	255
Brick (average)	660	Cement	200

Cost of Heating by Hot Water. (Approximately.)

Houses .. about 4*l.* per 1000 cubic feet.
Churches from 10*s.* to 25*s.* ,, ,,
Factories about 2*l.* ,, ,,

LINEAR EXPANSION BY HEAT. (From 32° to 212°.)

Deal	1 part in 2450
Brick, Fire	„ 2365
„ Common	„ 1818
Glass, Flint	„ 1177
Slate	„ 964
Iron, Cast	„ 901
„ Wrought	„ 846
Cement, Roman	„ 697
Brass	„ 584
Copper	„ 581
Tin	„ 403
Lead	„ 349
Zinc	„ 322
Steel	„ 877

32° Fahr. = freezing point.
212° „ = boiling „

Expansion of water on freezing = $\frac{1}{13}$th part of its bulk.

HEMP ROPES.

TO FIND THE BREAKING WEIGHT.

Square of the circumference × 0·2 = B. W. in tons.

SAFE WORKING LOAD OF GOOD HEMP ROPES. (Molesworth.)

Circum. of Rope.	Safe Working Load.			Circum. of Rope.	Safe Working Load.		
inches.	tons.	cwt.	qr.	inches.	tons.	cwt.	qr.
1	0	1	3	5½	2	9	1
1¼	0	2	3	5¾	2	14	0
1½	0	4	0	5¾	2	19	0
2	0	7	0	6	3	4	0
2¼	0	9	0	6¼	3	9	3
2½	0	11	0	6½	3	15	2
2¾	0	13	2	6¾	4	4	1
3	0	16	0	7	4	7	2
3¼	0	18	3	7¼	4	13	3
3½	1	1	0	7½	5	0	1
3¾	1	5	0	7¾	5	7	1
4	1	8	2	8	5	14	1
4¼	1	12	1	8¼	6	0	0
4½	1	16	0	8½	6	7	0
4¾	2	0	1	8¾	6	15	0
5	2	4	2	9	7	3	0

HOOP IRON.

Memoranda.

B. W. Gauge.	Width in in.	Weight per foot run.	Weight per 100 lineal feet.	B. W. Gauge.	Width in in.	Weight per foot run.	Weight per 100 lineal feet.
		lb.	lb.			lb.	lb.
12	2½	·91	91·78	16	1½	·27	26·52
13	2½	·71	71·23	17	1½	·21	20·84
13	2	·63	63·31	18	1	·16	16·16
14	1¾	·48	47·15	19	⅞	·12	12·37
15	1½	·36	36·37	20	¾	·087	8·84
15	1⅜	·33	33·34				

ICE, Strength of.

Ice 2 inches thick will afford a passage for men in single file on a row of planks, the rows being 9 feet apart.

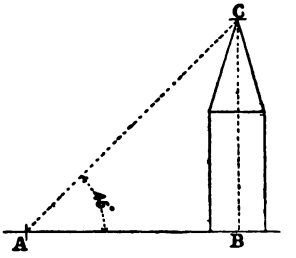
Ice 4 inches thick will bear the passage of cavalry carts at a moderate interval between each cart.

Ice 6 inches thick will afford a passage to waggons drawn by horses, with a moderate interval between each.

INACCESSIBLE HEIGHTS.

A Simple Method of Finding the Height of Towers and Spires.

Fig. 30.

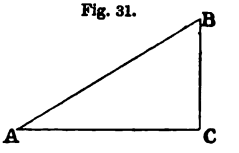


To find the height of B C, find a point A where an angle of 45° to the horizontal line (or perpendicular) will strike the height C; then

the length A B will be equal to the height B C, because A C will be the diagonal of a square of which A B, B C are equal sides.

MEASUREMENT OF HEIGHTS.

Fig. 31.

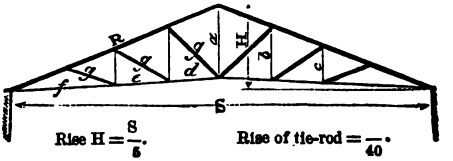


C B = tangent C A B × A C.

IRON ROOFS.

EXAMPLES OF IRON ROOFS. (From actual Practice.) (Molesworth.)

Fig. 32.

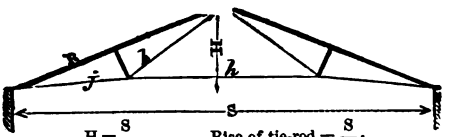


Rise $H = \frac{S}{5}$. Rise of tie-rod $= \frac{}{40}$.

Principals 6 feet 8 inches apart.

Span.	Rafter R.	Struts.	King and Queen Bolts.			Tie-rod.		
8 feet.	T-iron.	T-iron.	*a.*	*b.*	*c.*	*d.*	*e.*	*f.*
20	2½×2 ×⅜	2 ×2 ×⅜	⅝	⅝	..	⅝	⅝	..
25	2½×2½×⅜	2 ×2 ×⅜	⅞	⅝	⅝	1	1	..
30	2½×2½×½	2½×2½×⅜	1	⅝	⅝	1	1⅛	..
35	3 ×2½×½	2½×2½×⅜	1	⅞	⅞	1	1⅛	1⅛
40	3½×3 ×½	2½×2½×½	1⅛	1	⅞	1⅛	1⅛	1⅜
45	4 ×3½×½	3 ×3 ×½	1⅛	1	1	1⅛	1⅛	1⅜
50	4 ×3½×⅝	3 ×3 ×⅝	1⅛	1	1	1⅛	1⅜	1⅜
55	5 ×4½×⅝	4 ×4 ×½	1⅜	1⅛	1	1⅜	1⅛	1⅜
60	5 ×4½×⅝	4 ×4 ×⅝	1⅜	1⅛	1	1⅛	1⅜	1⅜

Fig. 33.



$H = \frac{S}{5}$. Rise of tie-rod $= \frac{S}{30}$.

Span.	Rafter T-iron.	h.	j.	k.
feet.				
20	$2\frac{1}{2} \times 2 \times \frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{8}$
25	$2\frac{3}{4} \times 2 \times \frac{3}{8}$	$\frac{5}{8}$	1	$\frac{5}{8}$
30	$2\frac{3}{4} \times 2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{1}{4}$	$2\frac{1}{2} \times \frac{3}{8}$	$2\frac{1}{2} \times \frac{1}{4}$
35	$3 \times 2\frac{3}{4} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{5}{16}$	$2\frac{1}{2} \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{5}{16}$
40	$3\frac{1}{2} \times 3 \times \frac{1}{2}$	$2\frac{1}{2} \times \frac{3}{8}$	$2\frac{1}{2} \times \frac{5}{8}$	$2\frac{1}{2} \times \frac{3}{8}$
45	$4 \times 3\frac{1}{2} \times \frac{1}{2}$	$3 \times \frac{3}{8}$	$3 \times \frac{1}{2}$	$3 \times \frac{3}{8}$

Thick lines in compression, fine lines in tension.

Tests of Iron.

A soft, tough iron, if broken gradually, gives long silky fibres of leaden-grey hue, which twist together and cohere before breaking.

A medium even grain with fibres denotes good iron.

Badly-refined iron gives a short blackish fibre on fracture. A very fine grain denotes hard steely iron, likely to be cold-short, and hard.

Coarse grain with bright crystallized fracture or discoloured spots denotes cold-short, brittle iron, which works easily when heated and welds well. Cracks on the edge of a bar are indications of hot-short iron. Good iron is readily heated, is soft under the hammer, and throws out few sparks.

JOISTS. See Floors, p. 46.

KENTISH RAGSTONE

In its resistance to pressure stands next to granite; but for transverse strain the numerous vents render it untrustworthy. It should not be used for lintels or in suspended positions. Headers are generally knocked out to 6-in., 7-in., 8-in., and 9-in. gauge for the height.

For price, see Mason in Price-book.

LEAD.

To Detect Lead in Water.

In a wineglassful of water put one drop of sulphide of ammonium, and stir it with a glass rod or a goose quill. If there be lead in the water, it will immediately discolour (black).

LEAD PIPES. See p. 83.

LIGHT.

To find the superficial area of light (or window) required to illuminate a room. (Gwilt.)

Superficial area of window = the square root of the cubical space of the room.

This rule is not universal in its application.

LIGHTNING-CONDUCTORS.

Ordinary Sizes used.

Upper rod, $\frac{3}{4}$ in. diameter.
„ pipe, $1\frac{1}{8}$ in. diameter and $\frac{1}{8}$ in. thick.

Lightning-conductors should be made to communicate with all metallic surfaces (such as gutters and pipes), and should be let into moist ground at the base.

LIMESTONES.

From Experiments. (Haswell.)

The purest limestones burn to a white lime, and produce the richest limes.

Rich limes are dissolved fully in water, and remain a long time without hardening: they increase in volume from 2 to $3\frac{1}{2}$ times their original bulk, and will not harden without the action of the air. They are rendered hydraulic by the admixture of pozzolana or trass.

Rich, fat, or common limes usually contain less than 10 per cent. of impurities.

Hydraulic limestones are those which contain iron and clay, so as to enable them to produce cements which become solid when under water.

The pastes of *fat limes* shrink in hardening to such a degree that they cannot be used as mortar without a large dose of sand.

Poor limes have all the defects of rich limes, and increase but slightly in bulk.

Lime absorbs in slaking about $2\frac{1}{2}$ times its volume and $2\frac{1}{4}$ times its weight in water.

Patent selenitic lime for plastering costs about 25*s.* per ton at the works, sets quickly, and will take 6 parts of sand on brickwork and 4 parts on lath; is of a good buff colour, and is readily worked to a smooth face; is also used in Government works for filling in the hollow parts of terra-cotta.

See also MORTARS, p. 72, 73.

LINTELS OVER OPENINGS.

Depth = 1¼ inch for every foot in length of bearing.

Breadth = thickness of walls to be carried by the lintel.

LOADS ON ROOFS.

EXCLUSIVE OF FRAMING.

	Per square of 100 sup. ft.
Lead covering	7 cwt.
Zinc	1½ „
Corrugated iron	3 „
Tiles	9 to 15 „
Slates	8 „ 9 „
Boarding ¾ in. thick	2½ „
Timber framing for slate or tile roof	5 „ 6 „
Additional load for pressure of wind	36 „

MENSURATION OF SURFACES.

Area of triangle = Base × ½ perpendicular.

„ circle = Diameter² × ·7854.

„ sector of circle = Length of arc × ½ radius.

„ „ „ = $\frac{\text{Number of degrees in arc} \times \text{area of the circle}}{360}$

Area of parabola = Base × ⅔ height.

Frustum of a parabola = ⅔ height $\times \frac{\text{base}^3 - \text{top}^3}{\text{base}^2 - \text{top}^2}$.

Area of ellipse = Transverse axis × ·7854 conjugate axis.

„ cycloid = Area of generating circle × 3.

Surface of cylinder = Area of both ends + length × circumference.

„ cone = Area of base + (circumference of base × ½ slant height).

„ sphere = Diameter² × 3·1415 = diameter × circumference.

„ frustum = Sum of girt at both ends × ½ slant height + area of both ends.

MEASUREMENT OF BUILDERS' WORK.

EXCAVATOR.

Digging is measured by the yard cube of 27 feet. Extra depths, methods of removing, whether by basket, barrow, or cart—if by barrow, and the distance is over 20 yards (called one run)—should be accurately described; also the final disposal of the materials

should be given, whether carted away, filled into trenches and rammed, filled in, levelled, and rammed to receive tile or other pavings, or disposed of in terraces.

Wells.

Cesspools and rain-water tanks are taken by themselves, a careful description of the sizes being given, also methods of lining, steining, and doming over. Well-digging is a separate calling, and it is generally made a condition with the well-digger that a certain quantity of water shall be obtained either by boring or digging, the contract not being complete unless the quantity of water described is obtained.

Drains are measured by the foot run, the size and quality of the pipes and method of jointing being accurately described; the average depth of the trenches must be given, the cost of digging, filling in, and ramming the earth after the drains are formed, and the carting away or other method of disposing of the superfluous earth, is charged for with the pipes, &c. All bends, junctions, traps, connections with cesspools, feet of rain-water or other pipes, all small cesspools, &c., are numbered, and the price charged always includes for the necessary digging, filling in, and disposal of the superfluous earth. Barrel drains formed of brick are measured at per foot run, as described for pipes. Brick sewers are measured by the rod superficial of 272 feet, 1½ brick thick, the work being accurately described; all labours, centres, &c., being measured as described in Bricklayer.

Concrete.

Concrete, in foundations or otherwise, above 12 inches thick, is measured by the cubic yard.

Concrete under pavings, &c., or when less than 12 inches thick, is taken by the superficial yard, stating thickness.

Concrete filling-in over arches should be classed separate.

Bricklayer.

All brick walls, &c., are measured and reduced to the "rod," containing 272 feet superficial, of 1½ brick thick. Circular work is classed separate. All openings are deducted. Ordinary flues are not deducted, but fire-place openings are.

The following items are taken at per foot superficial;—cuttings over 6 inches wide; facings and joint; arches, axed or gauged;

centering; trimmer arches; half-brick walls, in mortar or cement; damp course.

Vault arches, at per rod (reduced), stating thickness.

Groin, point, and cutting, at per foot run.

Cutting to skewbacks, &c.

Rake out any point to soffits, at per yard superficial.

At per Foot Run.

Birds' mouths, fair or rough; squints, fair or rough; forming channels for pipes; all splayed or moulded bricks in plinths; sills, strings, jambs, &c., in mortar or cement; brick on edge, or other coping in mortar or cement; cuttings to pavings, &c. Hoop-iron bond is generally measured by the foot run, the price including setting; sometimes it is taken at per cwt.; turning-piece to arches at per foot run, or number them.

At per Yard Superficial.

Rendering in cement by bricklayer, brick nogging; brick or tile pavings, in sand, mortar, or cement, stating, if brick, whether flat, on edge, or herring-bone, and size and thickness of tiles; raking out joints and pointing; fair joint on brickwork, and limewhiting, or colouring.

At per Number.

Flues cored and pargeted, stops and mitres to moulded and splayed bricks; relieving and discharging arches, stating length and width of soffit and number of rings; making good to ends of door and window sills, &c.; bedding and pointing to door and window frames; ends of timbers, cut and pinned; air-bricks and ventilators built into walls, and forming apertures for same; openings left in wall for drain-pipes, &c.; chimney-pots and fixing; ranges and stoves and setting to ditto; coppers and setting; chimney-pieces, and fixing to ditto; iron door and furnace bars, and fixing.

Chimney-bars are inserted in Smith's bill.

Tile Pavings

Are measured by the yard superficial. The size and quality of tiles and method of laying should be described, or, if possible, the prime cost of the tiles, either at the manufactory or on the building, should be given. All waste should be allowed for, and joints formed with wood or other floors measured by the foot run.

WALLER.

Rubble walling is generally measured by the yard cube of 27 feet; sometimes, however, it is measured by the foot superficial, the thickness being stated; it is also measured by the rod, reduced to a thickness of 13½ inches, as in brickwork.

The cause of so many methods being employed may, perhaps, be found in the fact that in the neighbourhood of London stone used for walling purposes is sold by the ton, and the labour is nearly always done by the rod, as before described.

No walls under 18 inches thick should be measured by the yard cube. All facings, cuttings, quoins, &c., are measured, and openings are deducted, as before described under the head of BRICKLAYER.

MASON.

All stone used as plinths, jambs, sills, heads of door and window openings, all quoins, ashlar, cornices, mullions, tracery, &c., &c., is measured by the foot cube. When hoisted over 40 feet, it should be so described. A bed and joint is taken to every block, and all plain, sunk, and moulded labours measured by the foot superficial. Throatings, splays, narrow margins, grooves for lead lights, &c., are measured by the foot run. Mitres, stoppings, cuspings, also all slate dowels, copper or other cramps, &c., are numbered. All stone over 6 feet in length has its scantling described. Pavings are measured by the foot or yard superficial, all cuttings, notchings, &c., being taken. Stone steps, thresholds, copings, curbs, and Portland or Yorkshire stone sills, used in brick buildings, are measured by the foot run, the scantling and labour on each being carefully described. Chimney-pieces are numbered.

SLATER AND TILER.

Slating and tiling is measured by the square of 100 feet superficial: 6 inches is allowed for all eaves and for cuttings to hips and valleys. Ridges, hips, and valleys are measured by the foot run, also all pointings to eaves and verge courses, and all cement or other filletings. Slate shelves are measured by the foot superficial, the work being accurately described as sawn, planed, or rubbed, as the case may be. Joints, edges, and sinkings are measured by the foot run; all perforations, rounded corners, &c., are numbered; slate cisterns are numbered—the size in the clear,

the thickness of sides, bottom, and mode of being put together, being given.

Carpenters' Work.

Timber employed in the construction of roofs, floors, partitions, lintels, &c., and when used in large scantlings, is measured by the foot cube. Timber is generally divided into—

Timber in plates, wood bricks, and lintels.
" framed in ground joists.
" " roofs, floors, and partitions.
" " and wrought.

Tie-beams, girders, or other timbers of a building over 30 feet long, are measured as before described, but are kept separate from the items already mentioned, as are also all timbers of large scantlings.

Centering to vaults is measured by the square of 100 feet superficial; extra labour to groin points, &c., is measured by the foot run. Centering to apertures is sometimes measured by the foot superficial; but a better plan is to number each centre, giving the width of the opening, the rise, width of soffit, girth round the centre, and the purpose for which the centre is to be used, whether for rough or fair brick arches, or for stone work. Trussed centres should be kept separate; they should be numbered and described as above, and the height from floor to the springing should be given. All centering is described as "use and waste."

Battenings, or boardings under slates or lead, are measured by the square; all gutters, eaves, and barge-boards are measured by the foot superficial. Struttings to press, springing, tilting, and other fillets, rolls for lead, &c., by the foot run. Cesspools in gutters, cut and shaped ends to timbers, &c., are numbered. Moulds required by the bricklayer are numbered and carefully described. All labours on timber should, as far as possible, be measured separately, because of the difficulty of fixing a price for same as per foot cube. Planing and moulded work is measured by the foot superficial; chamfers, grooves, scribings, &c., are measured by the foot run; mitres and stoppings are numbered.

Fences.

Wood fences are generally measured by the lineal rod of 16½ feet, giving a careful description.

Fancy fencing is measurod in detail.

JOINER.

Floors are measured by the square of 100 feet superficial, the several labours and method of laying being carefully described. Chimney-breasts are deducted; hearths are not deducted when mitred borders are put round them.

Skirtings are measured by the foot run; angles, housings, scribings, returned and mitred ends, are numbered; grounds and backings are generally included with the skirting.

Sashes and frames are measured by the foot superficial, taking the total width across the frames and the total height from the bottom of the sill to top of head: the description must include thickness of the sashes, the nature of moulding on same, mode of hanging, quality of lines, weights, and pulleys; the labour to the sill and any unusual material or labour used in the frame fully described. Sash-fasteners and lifts are numbered. Shutters, back linings, back flaps, backs and elbows, soffits, grounds, and boxings, are measured by the foot superficial; elbow-caps, blind-rails, shutter-latches, butts, back-flap hinges, and shutter-bars, are all numbered. All labours, as grooves, tongues, splays, &c., required to fix the foregoing, are measured by the foot run.

Casements and frames are sometimes measured by the foot superficial, as described to sashes and frames, the thickness of casements, scantlings, of sills, heads and jambs, being carefully given, together with the several labours to each. A method that is often adopted, is to measure the casements by the foot superficial, describing the thickness, labour, number of squares, whether fixed or hung, and taking the sills, heads, mullions, and jambs by the foot run, describing the scantlings and labour to each. Linings, soffits, and window-boards over 3 inches in width are measured by the foot superficial, all others by the foot run; the several labours required for fixing same to be measured as before described to shutters and fittings. The top and bottom rails, bars, and styles of larger sashes, as for shops, &c., are measured by the foot run, all scantlings and labours being accurately described. Notchings, scribings, and returned and mitred ends to window-boards are numbered.

Doors and other framings are measured by the foot superficial, so is all joiners' work, differing in this respect from carpenters' work, the horns of framed work not being measured in joiners' work; whereas the extreme length of all timber is measured in carpenters'

work. The thickness, number of panels, and all labours are accurately described to doors and other framings. Locks and butts are numbered. Jambs, soffits, and grounds are measured by the foot superficial, thicknesses and labours being described.

Architraves are measured by the foot run; mitres are sometimes included, at others numbered, as also are plinths for same; dovetailed backings are numbered, their length being described.

Stairs are measured by the foot superficial, careful descriptions of the thickness of treads and risers, modes of carrying same, and all details being accurately given. Winders are measured by themselves, as an extra piece is always allowed for them. Strings are measured by the foot superficial; ramps to same are numbered. Hand-rails, newels, and balusters are measured by the foot run. Framed ends, housings, moulded terminations, returned and mitred ends are numbered. Turned or carved balusters are numbered.

Door-frames are sometimes measured by the foot cube, at others by the foot run, careful descriptions of the labours and scantlings being given. In all cases the most careful description of thickness, methods of framing, and all other labours are absolutely necessary, in order that a true value may be obtained.

Plumber.

Lead flats, gutters, flashings, and linings of cisterns are measured by the foot superficial; the weight of lead per foot superficial being found, the total weight is easily ascertained and reduced into cwts. Lead in cisterns is kept separate from that as laid in gutters, flats, and flashings, as it is worth more per cwt., by reason of the extra labour required in fixing it. Soldered angles and copper nailings are measured by the foot run. Pipes are measured by the foot run, and the price includes for all joints, wall-hooks, and fixings; the weight per yard of the pipe used should be ascertained. Lead soil and socket pipes are also measured by the foot run, the size of the pipe and the weight per foot superficial of the lead used to be described; the price includes for joints, as before. Pieces of bent lead soil or socket pipes are numbered. D traps, service-boxes, taps, washers, and wastes are numbered. Zinc and copper are measured by the foot superficial, the weight per foot being described.

Smith and Founder.

Wrought-iron in chimney-bars, gratings, guard-bars, flitches, screw-bolts, saddle and stanchion bars, staircase-rails, and balus-

ters, is brought into cwts.; the price generally includes for screws, patterns, and fixing. Sometimes screws and bolts are numbered, and saddle and stanchion bars are priced out at the foot run; all labours not included in the price per cwt. are taken separate, as in other trades. Cast iron in girders, stanchions, columns, &c., &c., is brought in cwts., and is generally kept separate, *i.e.* girders from stanchions, stanchions from columns, &c., the price per cwt. includes patterns, proving, hoisting, and fixing. Hoisting and fixing is sometimes charged at per number, giving weight of girder. Rain-water pipes, eaves, gutters, skylight-bars, rails, railings, &c., are measured by the foot run. Heads, shoes, and bends to rain-water pipes, all outlets, angles, stopped ends, swans'-necks, &c., to eaves and gutters are numbered. Planings, turnings, and other labours to cast-iron work are taken separately, and are never included in the price per cwt. Stoves, ranges, coppers, &c., &c., are numbered and fully described.

Plastering.

Plasterings on walls and ceilings are measured by the yard superficial of 9 feet, all openings being deducted. Reveals to windows, soffits of arches, weatherings, fascias, and other work in small faces are measured by the *foot* superficial. Moulded cornices are measured by the foot superficial. Mitres, stoppings, &c., are numbered. It is customary to allow four mitres to internal cornices in every room; all beyond that number are taken and charged for, and are described as "extra mitres." Consoles, modillions, trusses, centre flowers, &c., are numbered; the cost of modelling is allowed for in the prices, the nature of the labours and the quality and kind of materials used being carefully described, and any speciality of either always mentioned.

Bellhanger and Gasfitter.

Bells and pulls are numbered, a detailed description of the bell, the pull, wire, cranks, &c., being given in each case.

Glazier.

Glass is either measured by the foot superficial, or the squares are numbered and the sizes given. The former method is generally used for crown, sheet, and other thin glass; the latter for plate glass.

Where glass is measured by the foot superficial, the sizes of the squares should be described as under 4 feet, ditto 6 feet, as the case

may be. Cuttings are measured by the foot run, and the price should include for patterns and risk.

Painter.

Painting, graining, and varnishing is measured by the yard superficial, careful descriptions of the preparations, labours, and varnish being given.

Skirtings, rails, balusters, pipes, eaves, gutters, rain-water pipes, &c., are measured by the foot run. Heads, &c., to rain-water pipes, angles to eaves, gutters, sash-frames, squares, &c., are numbered.

Paperhanger.

Papering is measured by the foot superficial; all openings are deducted. The net amount is then reduced into pieces, and it is customary to allow one piece in seven for waste.

MORTARS. (Haswell.)

1. All mortars are much improved by being worked or manipulated; and as rich limes gain by exposure to the air, it is advisable to work mortar in large quantities, and render it fit for use by a second manipulation.

2. The use of salt water in the composition of mortar injures the adhesion of it.

3. Composition: 1 of lime to 2 or 3 of sharp sand;

4. Or, 1 part of lime, 2 parts of sand, and 1 part of blacksmith's ashes.

5. An extremely hard mortar is obtained by using 1 part of Portland cement, 1 part of ground grey lime, and 6 parts of sharp sand.

6. Lime, 1; clean sharp sand, 2·5. An excess of water in slaking the lime swells the mortar. Sand should be clean and sharp.

Hydraulic Mortar.

7. Smeaton's mortar, as used at the Eddystone Lighthouse, was composed of equal parts of Aberthaw lime, in the state of hydrate of lime, in fine powder, and pozzolana, also in fine powder, well beaten in mullers, until it had acquired the utmost degree of toughness.

COMPARATIVE STRENGTH OF GREY LIME AND PORTLAND CEMENT MORTAR, ALSO PORTLAND CEMENT MORTAR WITH THE ADDITION OF LIME AND MORTAR.—Redgrave.

No.	No. of Tests.	Proportions.				Breaking Strain on 2·25 sq. in. in lbs.	Breaking Weight per sq. in. in lbs.	Ratio as compared with Lime Mortar.	Ratio as compared with Cement Mortar.	Remarks.
		Sand.	Cement.	Lime.	Water.					
1	17	2·00	..	1·00	1·33	61·06	27·13	..	..	Three samples.
2	27	2·00	..	1·00	1·33	106·07	47·09	..	..	Grey lime.
3	27	2·00	..	1·00	1·33	82·60	36·44	..	..	Water includes that required for slaking lime.
1	15	6·00	1·00	..	1·25	233·53	103·79	2·81 to 1	..	Cement taken from bulk in store.
2	20	8·00	1·00	..	1·66	154·80	68·80	1·86 „ 1	..	
3	35	10·00	1·00	..	2·00	112·88	50·16	1·36 „ 1	..	
1	70	6·00	1·00	0·50	1·50	165·31	73·47	2·00 „ 1	0·70 to 1	Water includes that required for slaking lime.
2	74	8·00	1·00	0·66	2·00	132·62	58·94	1·60 „ 1	0·85 „ 1	
3	85	10·00	1·00	0·83	2·50	95·27	42·34	1·14 „ 1	0·84 „ 1	
				Loam.						
1	21	6·00	1·00	0·50	1·00	136·80	60·80	1·64 „ 1	0·58 „ 1	Yellow loam, fresh dug, and rather damp.
2	25	8·00	1·00	0·66	1·33	86·48	38·43	1·04 „ 1	0·55 „ 1	
3	19	10·00	1·00	0·83	2·00	64·50	28·66	0·77 „ 1	0·57 „ 1	

See also LIMES, p. 63.

MOULDINGS.

EXAMPLES OF EARLY ENGLISH.

EXAMPLES OF NORMAN.

EXAMPLES OF DECORATED.

EXAMPLES OF PERPENDICULAR.

Rickman's Table of Nomenclature of English Architecture.

Kings.	Date.	Name of Period.	Remarks.
William I.	1066	Norman	Prevailed little more than 124 years; no remains really known to be more than a few years older than the Conquest.
William II.	1087		
Henry I.	1100		
Stephen	1135		
Henry II.	1154 to 1189		
Richard I	1189	Early English	Prevailed about 118 years.
John	1199		
Henry III.	1216		
Edward I.	1272 to 1307		
Edward II.	1307	Decorated	Continued perhaps 10 or 15 years later; prevailed little more than 70 years.
Edward III.	1327 to 1377		
Richard II.	1377	Perpendicular	Prevailed about 169 years. Few, if any, whole buildings executed in this style later than Henry VIII. This style used in additions and rebuildings, but often much debased, as late as 1630 or 1640.
Henry IV.	1399		
Henry V.	1413		
Henry VI.	1422		
Edward IV.	1461		
Edward V.	1483		
Richard III.	1483		
Henry VII.	1485		
Henry VIII.	1509 to 1546		

Nomenclature.—Seven Periods of English Architecture. (Sharpe.)

	A.D.	A.D.		
Romanesque.				
I. Saxon Period	From ——	to 1066	Prevailed —	years.
II. Norman Period	„ 1066	„ 1145	„ 79	„
III. Transitional Period ..	„ 1145	„ 1190	„ 45	„
Gothic.				
IV. Lancet Period	„ 1190	„ 1245	„ 55	„
V. Geometrical Period ..	„ 1245	„ 1315	„ 70	„
VI. Curvilinear Period ..	„ 1315	„ 1360	„ 45	„
VII. Rectilinear Period ..	„ 1360	„ 1550	„ 190	„

PAINTERS' MEMORANDA.

A gallon of mixture, or 6 pints of raw linseed oil, 1 pint of boiled oil, 1 pint of turpentine, requires from 12 to 14 lb. of dry paint.

These proportions vary according to circumstances.

A Gallon will cover	Superficial yd.	Superficial feet.
On stone or brick, about.. ..	25 to 30	225 to 270
On compo, &c. .. .. from	40	360
„ .. .. .. to	50	450
On wood .. .. .. from	50	450
„ .. .. .. to	78	630
On well-painted surface or iron	80	720
One gallon tar, first coat.. ..	12	108
„ „ second coat ..	16	192

Priming.—White-lead (sometimes mixed with chalk) diluted with linseed oil.

Knotting.—Red-lead and size.

Putty.—Spanish whiting and linseed oil well beaten and kneaded into a stiff paste.

PROPORTIONS OF COLOURS FOR ORDINARY PAINTS.

Colours.	Ingredients by Weight.						
	White-lead.	Lamp-black.	Red-lead.	Red Ochre.	Verdi-gris.	Burnt Umb.	Spanish Brown.
White ..	100	—	—	—	—	—	—
Black ..	—	100	—	—	—	—	—
Green ..	25	—	—	—	75	—	—
Stone ..	99	—	—	—	—	1	—
Lead ..	98	2	—	—	—	—	—
Red ..	—	—	50	50	—	—	—
Chocolate	—	4	—	—	—	—	96

PAVIORS' MEMORANDA.

1 ton of 6-in. granite paving will cover 4 yards superficial.
1 ton of 7-in. granite paving will cover 3½ yards superficial.
1 ton of 9-in. granite paving will cover 2½ yards superficial.
1 ton of pebble paving will cover 4 yards superficial.
1 ton of ragstone will cover 5 yards superficial.
13½ cubic feet of granite = 1 ton.
14 „ Purbeck = „

		Weight per foot superficial.
2-inch York paving	=	26 lb.
2½ " "	=	32½ "
3 " "	=	39 "
4 " "	=	52 "
5 " "	=	65 "
6 " "	=	78 "

PERSPECTIVE.

To find the vanishing points, &c., and draw a perspective representation of an object.

Let O, Fig. 34, be plan of the object to be put in perspective.

Let F O be front elevation of ditto.

Let S O be side elevation of ditto—all to scale.

Let S be the point of sight or place where the spectator stands, and let P P be the picture plane touching the nearest point of the object.

To find the vanishing points,

From S draw a line S V^1 parallel to the front of the object $y\,w$, and continue the line until it intersects the picture plane. The point of intersection V^1 is the vanishing point for all horizontal lines on the plane $y\,w$.

In the same way, from S draw a line S V^2 parallel to the front of the object $y\,x$. V^2 is the vanishing point for all horizontal lines on the plane $y\,x$.

From O (the object) draw lines, as shown, to the point of sight S. The points where these lines intersect the picture plane are to be transferred to the perspective drawing.

A handy way is to mark the points on a slip of paper, and transfer them to the sheet where the perspective is to be drawn.

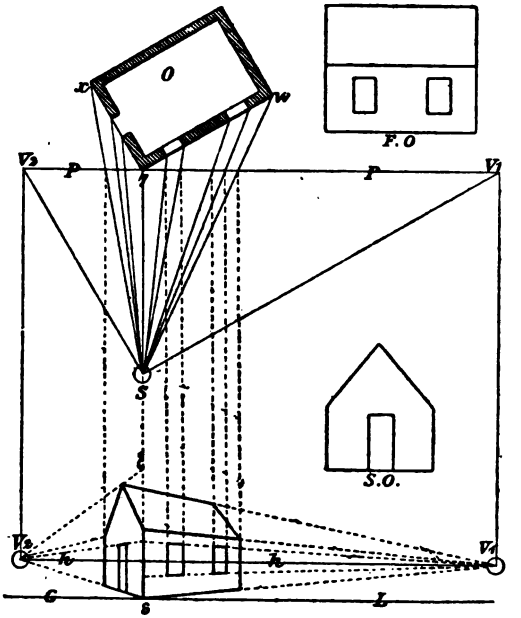
The perspective drawing:

Let G L be the ground line; draw another line $h\,h$ parallel to it and about 5 ft. 6 (by scale) above it. $h\,h$ is the horizontal line. Transfer the vanishing points V^1 and V^2 to the horizontal line. The points where the lines drawn from O (the object to the point of sight S) intersect the picture plane are transferred to G L, the ground line of the picture.

The point y, where the object touches the picture plane, becomes $m\,l$, the measuring line, on which all heights are measured off according to the scale and drawn to the vanishing points.

Fig. 34.

PERSPECTIVE.



PIERS, &c.

GREATEST SAFE LOAD PER SQUARE FOOT.

Granite piers	40 tons
Portland stone piers	13 „
Bath „	8 „
Brickwork in cement	3 „
Rubble masonry	2 „
Lime-concrete foundations	2½ „

PILES. ('Civil Engineers' Journal.')

When the length of an oak pile does not exceed 16 times its diameter, it may be loaded permanently with a weight of 450 lb. per square inch of its sectional area.

To estimate the weight that can be safely borne upon a pile: As many times the weight of the ram as the distance which the pile is sunk, the last blow is contained in the distance which the ram falls in making the blow, divided by 8 inches, which, when reduced to a formula, becomes

$$\frac{(R \times h \div d)}{8} = W.$$

R = Weight of ram in lb.
h = Height of the fall in inches.
d = Distance the pile is depressed in inches.

Example.—A ram weighing 3500 lb., falling 42 inches, depresses a pile 4·2 inches. Then

$$\frac{3500 \times (42 \div 4{\cdot}2)}{8} = \frac{35000}{8} = 4375 \text{ lb.},$$

the weight which the pile could bear with safety.

Another rule:

$$L = \frac{W H}{8 D}.$$

W = Weight of ram (generally about 4 cwt.).
D = Distance in inches that pile is driven by last blow of ram.
H = Height the ram has fallen in inches.
L = Safe load for pile in cwt.

Another rule:

The number of times that the distance driven is contained in the distance of the fall of the ram, divided by eight, is the number of times the weight of the ram that the pile will bear.

Example.—A ram weighing 5 cwt. falling 20 feet drives a pile half an inch.

20 feet = 480 half inches;
480 ÷ 8 = 60 × 5 = 300 cwt.

PILLARS.

Brick and stone pillars should never exceed in height 12 times their thickness at the base, and the safe load should not exceed $\frac{1}{10}$th of that required to produce fracture.

PILLARS OF FIR (SQUARE OR RECTANGULAR).

		Safe load per sq. in. of sectional area.
When length	= 10 times the least thickness	400 lb.
"	= 15 " "	325 "
"	= 20 " "	260 "
"	= 25 " "	225 "
"	= 30 " "	160 "
"	= 35 " "	120 "
"	= 40 " "	90 "

Oak pillars about $\frac{1}{6}$th stronger than fir.

WOODEN PILLARS.

Approximate Rule for the Strength of Rectangular Pillars of Wood. (Molesworth.)

L = Length of pillar.
B = Breadth of pillar.
W = Crushing weight in lb. per sq. in. of section.

$$\text{Safe load per sq. in. of sectional area} = \frac{W}{10}.$$

Material.	Values of W when L or Length is equal to				
	8 B.	12 B.	24 B.	36 B.	48 B.
Oak.. ..	5500	4600	2700	1800	900
Ash ..	6000	5000	3000	2000	1000
Red pine .	4800	4000	2400	1600	800

PLASTERER.

2 hods plaster, &c. (about)	=	1 bushel.
2 bushels of grey lime	=	1 bag.
3 " blue lias	=	1 bag.
3 " sand	=	1 barrel or basket.
21 " "	=	1 yard.
3 " cement	=	1 sack.
4 " Portland	=	1 cask.
5 " Roman	=	1 cask.
$\frac{3}{4}$ full bushel of Parian cement	=	1 hod.
36 bushels sand	=	1 load.
14 lb. plaster	=	1 bag.
7 bags "	=	1 bushel.
$1\frac{1}{4}$ bushel plaster	=	1 cwt.
$3\frac{3}{4}$ cwt. Portland cement	=	1 cask.
1 firkin plaster	=	$\frac{3}{4}$ cwt.
1 " of double size	=	48 lb.
2 dozen whiting	=	1 cwt.
30 bundles of laths	=	1 load.

1 bundle of laths contains (nominally) 500 feet.

Single fir laths are less than ¼ in. thick.

Double fir laths are about ⅜ in. thick.

1 bundle of laths and 500 nails will cover about 5 superficial yards.

12 lb. whiting, ½ lb. blue-black, 1¾ gal. of size are required for 100 yards (superficial) "once" done; 21 lb. of whiting, ¾ lb. blue-black, 2⅜ gals. of size, if "twice" done.

Thickness of Compo.	¼ Inch.	½ Inch.	1 Inch.
	yards.	yards.	yards.
1 bushel of cement . . will cover	2¼	1¼	1¼
1 ditto of ditto and 1 of sand „	4½	3	2½
1 ditto of ditto and 2 „ „	6¾	4½	3¾
1 ditto of ditto and 3 „ „	9	6	4½

½ inch is the usual thickness.

1 cubic yard of chalk lime, 2 yards of road drift or sand, and 3 bushels of hair will cover 75 yards of render, and set on brick, and 70 yards on lath, or 65 yards plaster or render, two coats, and set on brick, and 60 yards on lath. Floated work will require about the same as two coats, and set.

Coarse Stuff.—Common lime mortar, with a small quantity of hair; or, by volumes, lime paste, 1 part; sand, 2 to 2½ parts; hair, ⅛ part.

Fine Stuff.—Lime paste, slaked to a paste, with a moderate quantity of water, afterwards diluted to the consistency of cream, and then allowed to harden by evaporation to the required consistency for working. When mixed with sand or plaster of Paris, it is used for the finishing coat.

Gauged Stuff is composed of from 3 to 4 parts of fine stuff and 1 part plaster of Paris, in proportions regulated by the rapidity required in hardening. For cornices, &c., the proportions are equal parts of each (fine stuff and plaster).

PLUMBER.

Cast lead is made in sheets about 6 feet wide and 16 or 18 feet long. Milled lead in 7-feet widths and about 25 feet long.

THICKNESS OF LEAD.

lb.	inches.	lb.	inches.
4 =	·068	7 =	·118
5 =	·085	8 =	·135
6 =	·101	9 =	·152

DIAMETER AND BORE OF STRONG LEAD PIPES.

Bore.	Outside Diam.	Bore.	Outside Diam.
½-in. pipe	⅞ inch.	1½-in. pipe	2 inches.
¾ „	1⅛ „	2 „	2½ „
1 „	1⅜ „	2½ „	3 „
1¼ „	1⅝ „		

SOLDER REQUIRED FOR JOINTS.

½-in. pipe	¾ lb.	1½-in. pipe	1¾ lb.
¾ „	1 „	2 „	2¼ „
1 „	1¼ „	2½ „	2¾ „
1¼ „	1½ „		

WEIGHT OF LEAD PIPE.

	Light.	Middling.	Strong.
	lb.	lb.	lb.
½-in. pipe (15-ft. lengths) ..	15	17	22
¾-in. „ „ „ ..	17	20	24
¾-in. „ „ „ ..	24	28	32
1-in. „ „ „ ..	36	42	50
1¼-in. pipe (12-ft. lengths) ..	36	42	52
1½-in. „ „ „ ..	48	56	64
1¾-in. „ „ „ ..	76	84	96
2-in. „ „ „ ..	84	96	112

Expansion of lead by heat (32° to 212°) = 1 part in 349.

No sheet of lead should be laid a greater length than 12 feet in one piece, or without a drip, to allow for expansion and contraction.

POINTING.

Tuck pointing is the joints well raked out and filled in again with blue mortar, and the courses of the brickwork marked with the trowel, and then plaster is inserted in the joints and finished, projecting of a parallel width.

Flat pointing is raking out the joints, and filling in again with blue mortar.

PORTLAND CEMENT.

Tensile strength, from 350 lb. per square inch after seven days.

Very strong Portland cement is heavy, weighing about 110 lb. to 114 lb. per bushel, and sets slowly.

Quick-setting cement has generally too much clay in its composition, and is of a brownish colour, and is weaker than the other. It should only have sufficient water to reduce it to a paste.

Proportionate strength of Portland cement mixed with sand to neat cement:—

1 of sand to 1 of cement, $\frac{2}{3}$ths the strength of neat cement.
2 of sand to 1 of cement, one-half the strength of neat cement.
3 of sand to 1 of cement, $\frac{1}{3}$rd the strength of neat cement.
4 of sand to 1 of cement, $\frac{1}{4}$th the strength of neat cement.
5 of sand to 1 of cement, $\frac{1}{5}$th the strength of neat cement.

Roman cement, about $\frac{1}{3}$rd the strength of Portland. See also CEMENTS, p. 19.

POZZOLANA.

Used in the preparation of mortar (see MORTARS) for docks, quays, foundations, and in hydraulic work required to be kept dry, and for preventing filtration. The price per cargo on board ship at ports in the United Kingdom is about 1*l.* 13*s.* per ton.

PREPARATION FOR PREVENTING WET PENETRATING WALLS CONSTRUCTED OF BRICK OR STONE.

2½ lb. of soft soap.
1 lb. rock alum.
1 gallon linseed oil.

The soap and oil to be boiled over a good fire a considerable time, till perfectly amalgamated. The alum to be finely pounded and mixed with the oil in small quantities at a time, and the mixture is to be constantly stirred until the alum is incorporated with the oil and soap. When this is done, the mixture is to be strained off into cans for use. The mixture requires particular attention, both in preparing and applying it, to ensure success. It is very important the walls should be perfectly dry when applied, and it must be applied slowly and carefully on the surface to be covered.

PRESERVATION OF WOOD. ('Civil Engineers' Journal.')

Kyanizing.—Kyan's specific solution: 1 lb. of chloride of mercury to 4 gallons of water. Long immersion in the liquid in open vats, or great pressure upon both solution and wood, in large wrought-iron tanks, is necessary for the complete injection of the liquid.

The durability of well-Kyanized timber has been proved.

Burnettizing.—A solution of chloride of zinc—1 lb. of salt to 10 gallons of water—is forced into the wood under a pressure of 150 lb. per square inch.

Boucherie's Process.—A solution of sulphate of copper 1 lb. to water 12½ gallons, or pyrolignite of iron 1 gallon to water 6 gallons. Application: one end of the green stick is enclosed in a close-fitting collar, to which is attached an impervious bag communicating through a flexible tube with an elevated reservoir containing the salt liquid. Hydrostatic pressure soon expels the sap at the opposite end of the log. When the solution makes its appearance also, the process is complete.

Eighty thousand sleepers of the most perishable woods impregnated with this solution were laid down on French railways, and after nine years' exposure were found as perfect as when laid.

Both of the last-named processes are comparatively cheap.

Creosoting, or Bethell's Process, subjects the timber and dead oil, enclosed in huge iron tanks, to a pressure varying between 100 and 200 lb. per square inch—about 12 hours.

From 8 to 10 lb. of oil are thus injected into each cubic foot of wood. Timber thus prepared is not affected by exposure to air and water, and requires no painting.

Coal-tar.—While an external application of coal-tar promotes the preservation of *dry timber*, nothing more rapidly hastens decay than such a coating upon the surface of green wood—a mistake often made, and dry rot, instead of wet rot, does the work of destruction. Farmers often resort to the latter method for the preservation of fence posts; but unless they discriminate between *green* and *seasoned* timber, the operation will prove injurious instead of beneficial.

RANSOME'S PROCESS FOR PRESERVING STONE.

The stone or other material is coated or saturated wholly or superficially with a solution of soluble silicate, and has afterwards applied to it a solution of chloride of calcium, by which an insoluble silicate of lime is formed in the body of the stone. In place of a soluble silicate and chloride of calcium, other preparations may be used; the invention consisting in the application in succession of two solutions, which, by mutual decomposition,

produce an insoluble substance, which is deposited in the structure and on to the surface of the stone or other material. Ransome's process, it is said, not only prevents new stone from decaying, but effectually prevents the further decay of that which is already rapidly approaching disintegration. The efficacy of this mineral is not confined to stone alone, but it may be applied to brick, lime, stucco, &c., with equally effective results.

RAINFALL PER ANNUM. (Society of Engineers.)

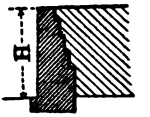
	Inches.
Ashton (Lancashire)	40
Belfast	32
Bolton	50
Cambridgeshire	22
Dublin	45
Glasgow	60
Greenock	60
Huddersfield	33
Liverpool	55·5
Macclesfield	40
Manchester	37
Oldham	35
Paisley	56·33
Preston	43
Plymouth	44
Southampton	23

RETAINING WALLS. (J. T. Hurst.)

DIAGRAM SHOWING THE SECTION OF WALL USUALLY ADOPTED IN PRACTICE.

The thickness for about ⅓rd of the height from base is made equal to $\frac{H}{3}$, and it is reduced towards the top in regular offsets at the back. The face is generally made to batter from 1 in 6 to 1 in 10.

Fig. 35.



Retaining walls should be well drained at the back and have "weep holes," in the proportion of one to every superficial yard of wall, to let the water escape.

ROLLED IRON JOISTS. See also pp. 54 to 56.

TABLE SHOWING SAFE LOAD IN TONS DISTRIBUTED, CALCULATED AT $\frac{1}{4}$TH THE BREAKING WEIGHT.

Depth of Joist.	Size of Flange.	Safe Load for Different Spans.			
		10 feet.	15 feet.	20 feet.	25 feet.
inches.	inches.	tons.	tons.	tons.	tons.
5	2 × $\frac{1}{2}$	1·65	—	—	—
6	2$\frac{1}{2}$ × $\frac{1}{2}$	2·5	1·65	1·25	—
7	3 × $\frac{1}{2}$	3·5	2·25	1·75	1·25
8	3 × $\frac{5}{8}$	5·0	3·25	2·5	2·0
9	4 × $\frac{5}{8}$	9·	6·	4·5	3·5
10	4$\frac{1}{2}$ × 1	15·	10·	7·5	6·

ROOFS.

SCANTLINGS OF TIMBER ROOFS. (Tredgold.)

S = Span of roof in feet.
L = Length of piece in feet.
A = Area of section in inches.
B = Breadth in inches.
D = Depth in inches.

King-post roofs are adopted from 20 to 30 feet span.
Queen-post „ „ 30 to 45 „

KING POSTS.

$A = L_{\text{ft}} \times 0{\cdot}12$ for fir, or by $0{\cdot}13$ for oak.

$$B = \frac{A}{D}. \qquad D = \frac{A}{B}.$$

Or,

Rule.—Multiply the length of the post in feet, by the span of the roof in feet, and the product multiplied by the decimal 0·12 for fir, or by 0·13 for oak, will give the area of the king post in inches. The area divided by the breadth will give the thickness, or by the thickness will give the breadth.

When a wrought-iron rod is used instead of wooden king post, to find the diameter of rod—

Rule.—Multiply the square root of the span of roof in feet by 0·2, and the result will give the diameter of rod in inches.

Figs. 36 and 37 show the usual method of framing a king-post roof.

Fig. 36.

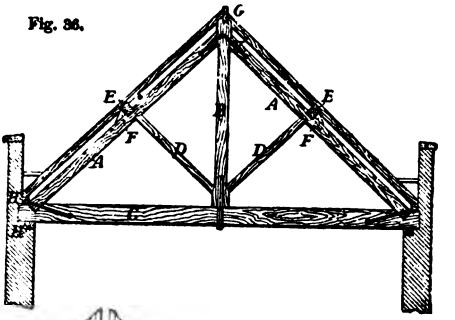
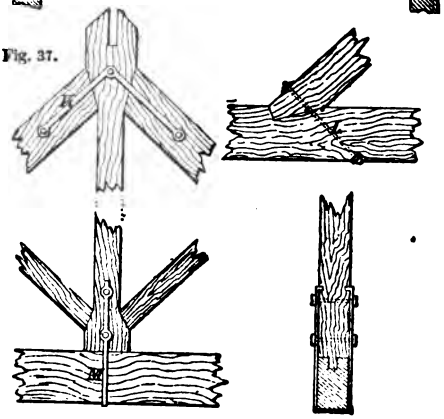


Fig. 37.



A is the principal rafters.
B „ king post.
C „ tie-beam.
D „ struts.
E „ purlins.
F „ cleats to same.
G „ ridge board.
H H „ roof plate and wall plate.
K „ wrought-iron straps at apex of principal rafters.
L „ wrought-iron bolt at feet of principal rafters.
M „ wrought-iron strap at bottom of king post.

Queen Posts.

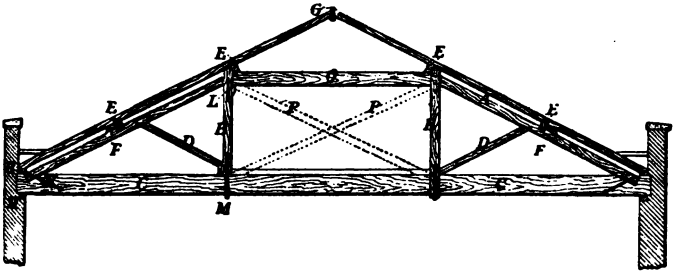
$A = Lp \times 0{\cdot}27$ for fir, or $0{\cdot}32$ for oak, p being the length in feet of that part of the tie-beam supported by the queen post, generally half the span.

Or,

Rule.—Multiply the length of the queen post in feet, by that part of the length of the tie-beam it supports, also in feet; the product multiplied by the decimal $0{\cdot}27$ for fir, or by $0{\cdot}32$ for oak, will give the area of the queen post in inches. This area divided by the breadth will give the thickness, and by the thickness will give the breadth.

Fig. 38 shows the usual method of framing a queen-post roof.

Fig. 38.



A is the principal rafters.
B „ queen posts.
C „ tie-beams.
D „ struts.
E „ purlins.
F „ cleats to same.
G „ ridge board.
H H „ roof and wall plates.

K, L, and M is the wrought-iron straps and bolts.
O is the straining beam.
P is the diagonal braces used to large spans.

Tie-Beam

$D = \frac{l}{\sqrt[3]{B}} \times 1{\cdot}47$ for fir, or $1{\cdot}52$ for oak, l being the length in feet of the longest unsupported part.

Or,

Rule.—Divide the length of the longest unsupported part by the

cube root of the breadth, and the quotient multiplied by 1·47 for fir, or by 1·52 for oak, will give the depth required in inches.

Example.—The length of the largest unsupported part of the tie-beam in a king-post roof of 28 feet span, as Fig. 36, is, say 14 feet; let the thickness be 6 inches. Then the cube root of 6 is 1·81, therefore $\frac{14 \times 1{\cdot}47}{1{\cdot}81} = 11\frac{1}{2}$ inches (nearly), the depth required.

When the tie-beam carries a floor, the rule is the same as for girders.

Principal Rafters.

When there is a king post,

$$D = \frac{L^2 s}{B^3} \times {\cdot}096 \text{ for fir.}$$

Or,

Rule.—Multiply the square of the length of the rafter in feet, by the span in feet, and divide the product by the cube of the thickness; the quotient multiplied by ·096 will give the depth in inches for fir.

When there are two queen posts,

$$D = \frac{L^2 s}{B^3} \times 0{\cdot}15 \text{ for fir.}$$

Or,

Rule.—Multiply the square of the length of the rafter in feet, by the span in feet, and divide the product by the cube of the thickness in inches; the quotient multiplied by 0·15 will give the depth in inches for fir.

Straining Beam.

The depth should be to the thickness as 10 to 7 as nearly as possible.

$$D = \sqrt{L s^{\frac{1}{2}}} \times 0{\cdot}9 \text{ (fir).} \qquad B = 0{\cdot}7\,D.$$

Or,

Rule.—Multiply the square root of the span in feet, by the length of the straining beam in feet, and extract the square root of the product; this root multiplied by 0·9 will give the depth in inches for fir. To find the thickness, multiply the depth by the decimal 0·7.

Struts and Braces.

$$D = \sqrt{L p^{\frac{1}{2}}} \times 0{\cdot}8 \text{ (fir).} \qquad B = 0{\cdot}6\,D,$$

p being the length in feet of that part of the principal rafter supported by the strut.

Or,

Rule.—Multiply the square root of the length of the rafter supported, in feet, by the length of the brace or strut in feet, and the square root of the product multiplied by 0·8 for fir will give the depth in inches. The depth multiplied by the decimal 0·6 will give the breadth.

PURLINS.

$$D = \sqrt[4]{L^3 C} \text{ fir, or by } 1{\cdot}04 \text{ for oak,}$$
$$B = 0{\cdot}6\,D,$$

C being the distance in feet that the purlins are apart.

Or,

Multiply the cube of the length of the purlins in feet, by the distance they are apart in feet, and the fourth root of the product will give the depth in inches for fir. The depth multiplied by the decimal 0·6 will give the breadth.

COMMON RAFTERS.

$$D = \frac{L}{B^{\frac{1}{3}}} \times 0{\cdot}72 \text{ for fir, or } 0{\cdot}74 \text{ for oak.}$$

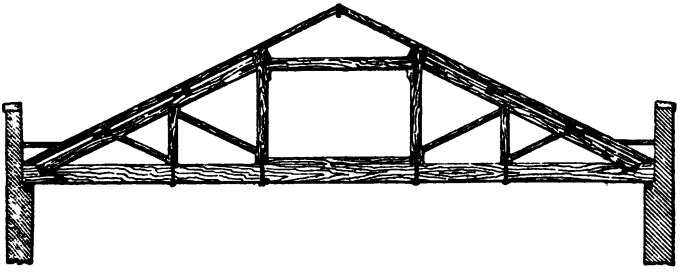
When the rafters are 2 inches thick,

$$D = {\cdot}57\,L \text{ for fir.}$$

Or,

Rule.—Divide the length of the bearing in feet, by the cube root of the breadth in inches, and the quotient multiplied by 0·72 for fir, or by 0·74 for oak, will give the depth in inches.

Fig. 39.



Wooden Roofs.—Table of Scantlings.

	Span in feet.	Tie-Beam.	Principal Rafter.	King Post.	Queen Post.	Small Queens.	Straining Beam.	Struts.
		in.	in.	in.	in.	in.	in.	in.
A	20	9½ × 4	4 × 4	4 × 4	—	—	—	3½ × 2½
A	22	9½ × 5	5 × 3	5 × 3	—	—	—	3¾ × 2½
A	24	10½ × 5	5 × 4	5 × 4	—	—	—	4 × 2½
A	26	11½ × 5	5½ × 4	5½ × 4	—	—	—	4½ × 2½
A	28	11½ × 6	6 × 4	6 × 4	—	—	—	5 × 2¾
A	30	12½ × 6	6 × 4½	6 × 4½	—	—	—	5 × 3
B	32	10½ × 4½	5 × 4½	—	4½ × 4	—	6¾ × 4½	4 × 2½
B	34	10½ × 5	5½ × 4½	—	4½ × 4½	—	7 × 4½	4 × 2½
B	36	11 × 5	6 × 5	—	5 × 4½	—	7 × 5	4½ × 2½
B	38	11 × 5½	6½ × 5	—	5 × 5	—	7½ × 5	4½ × 2½
B	40	12 × 5½	7 × 5½	—	5 × 5½	—	8½ × 5½	4½ × 2¾
B	43	12 × 6	7 × 6	—	6 × 5	—	8½ × 6	4½ × 3
B	46	13 × 6	7 × 6	—	6 × 5½	—	8½ × 6	4¾ × 3
C	50	13 × 8	8½ × 6	—	6½ × 6	6 × 4	9 × 6	4½ × 3
C	55	14 × 9	8½ × 7	—	7 × 6½	7 × 4	10 × 6	5 × 3
C	60	15 × 9	9 × 7	—	7½ × 7	7 × 4	10 × 7	5½ × 3

The roofs within the bracket A are king-post roofs, as Fig. 36. The roofs within the bracket B are queen-post roofs, as Fig. 38. The roofs within the bracket C are queen-post roofs, as Fig. 39.

Scantlings of Purlins.

Bearing in feet.	Distance apart in feet.		
	7	8	9
6	6 × 4	6½ × 4	6½ × 4½
7	7 × 4	7½ × 4	7½ × 4½
8	7 × 5	7½ × 5	8½ × 5
9	8½ × 5	8½ × 5½	9 × 5½
10	8½ × 6	9 × 6	9½ × 6
12	10½ × 6½	10½ × 7	11 × 7

Common Rafters (12 in. apart).

For a bearing not exceeding—

	Scantling of rafter.
6 feet ..	3½ in. × 2½ in.
8 feet ..	4 in. × 2½ in. or 4½ in. × 2½ in.
10 feet ..	5 in. × 2½ in.
12 feet ..	6½ in. × 2½ in. or 6 in. × 3 in.
14 feet ..	7½ in. × 2½ in. or 7 in. × 3 in.

SAFE LOAD ON PIERS, &c. See Piers, p. 79.

SCARFED JOINTS IN BEAMS, &c. (Tredgold.)

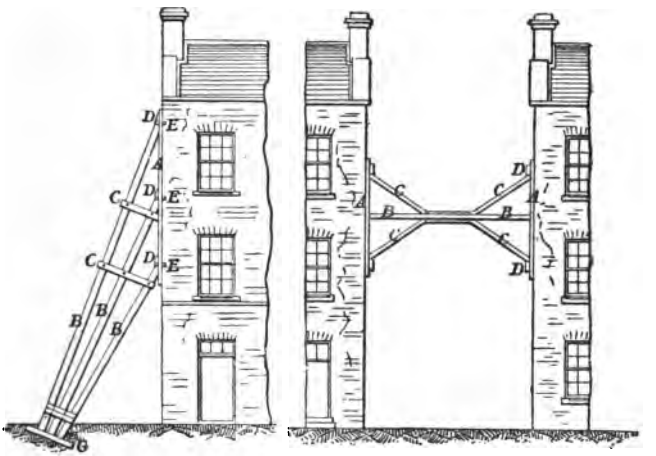
THE PROPORTION OF LENGTH OF SCARF TO DEPTH.

	Without Bolts.	With Bolts.	With Bolts and Indents.
Oak, ash, elm ..	6 D	3 D	2 D
Fir	12 D	6 D	4 D

SHORING.

Figs. 40 and 41 show the usual method of shoring dangerous structures.

Fig. 40. Fig. 41.



A, Fig. 40, is a plank about 9 in. × 3 in. placed against wall.

E, E, E, are the NEEDLES, about 6 × 4, passing through the plank, and leaving about 5 in. projection outside, and let the same distance into the wall.

D, D, D, are CLEATS spiked to the plank on the upper side of each needle.

B, B, B, are the SHORES; size from 6 in. × 6 in. to 12 in. × 6 in. according to the size of building; fixed as block G buried in the ground, and under the needles. The longest shore is called the "*top raker*," the middle one the "*middle raker*," and the other the "*bottom shore*."

SILK.

When a cordage is required of the least possible weight for a given strength or for a given resilience, without regard to expense then, without a doubt, the best material is silk. (Rankine.)

SLATER.

TABLE OF THE SIZE OF SLATES AND PROPORTIONS USED IN ROOFING.

Name of Slate.	Size.	Gauge.	No. of Squares covered by 1200.	No. required to cover 1 Square.	1st Quality. Weight per Thousand (1200).
	in. in.				cwt.
Doubles ..	12× 8	4½	2·8	430	17½
„ ..	13× 6	5	2½	480	15
Ladies ..	14×12	5½	5	240	31
„ ..	15× 8	6	4	300	25
Viscountess	18×10	7½	6	200	34
Countess ..	20×10	8½	7	171	40
Marchioness	22×12	9½	9½	130	52
Duchess ..	24×12	10½	10	125	60

Name.	Size.	No. of Squares covered by 1 Ton.
	in. in.	
Queens ..	Lengths 27 to 36 × irregular widths	2½
Imperials	„ 27 to 36 × „	2
Rags ..	„ random × „	2

SMITH.

To PREVENT RUST.

Iron straps and bolts should before use be heated to a blue heat, and then struck over with raw linseed oil.

A strap 1 in. wide may be $\frac{3}{16}$ in. thick.
„ $1\frac{1}{2}$ „ „ $\frac{5}{16}$ „
„ 2 „ „ $\frac{3}{8}$ „

WEIGHT OF COMMON FURNACE-BARS.

10-in. bars	each =	3½ lb.
12-in. „	„ =	4¾ „
14-in. „	„ =	7½ „
18-in. „	„ =	9½ „
22-in. „	„ =	15½ „
27-in. „	„ =	21½ „
36-in. „	„ =	33 „

Rain-water pipes are made in 6-ft. and 3-ft. lengths.
Eaves gutters are made in 6-ft., 4-ft., 3-ft., and 2-ft. lengths.

Size of Bolts, Nuts, &c.

Thickness of nut = $1\frac{1}{8}$ diameter of bolt.

Thickness of head = $\frac{3}{4}$ diameter of bolt.

Diameter of head and nut, square of hexagon, from side to side = $1\frac{3}{4}$ diameter of bolt.

Ditto ditto, from angle to angle = 2 diameters of bolt.

Washers, half the thickness of head and twice the area.

For weight of wrought and cast iron, &c., in pipes and sheets, see Weights.

SOUND, Velocity of. See Velocity, p. 136.

STAIRS.

Proportion of Treads to Risers.

			Inches.
Breadth of tread 7 in.,	height of riser 8		
„ „ 8 „	„	$7\frac{1}{2}$ to 8	
„ „ 9 „	„	7 „ $7\frac{1}{2}$	
„ „ 10 „	„	$6\frac{1}{2}$ „ 7	
„ „ 11 „	„	6 „ $6\frac{1}{2}$	
„ „ 12 „	„	$5\frac{1}{2}$ „ 6	
„ „ 13 „	„	5 „ $5\frac{1}{2}$	
„ „ 14 „	„	$4\frac{1}{2}$ „ 5	
„ „ 15 „	„	4 „ $4\frac{1}{2}$	

STONES.

The following materials will on an average weigh 1 ton:—

	Cubic feet.
Bath stone	19·5
Portland stone	from 15·25 to 17·60
Chilmark (Crystalline beds)	14·60 to 17·20
„ (Oolite)	
Wardour (Crystalline)	
Ketton stone	from 17·5 „
Bramley Fall stone ..	„ 15·75 „
Abercarne stone	13·33
Craigleith stone	15·5
Bolsover stone	14·75
Cadely stone	17·75
Granite	13·5

BUILDING STONES. From the Report of the Select Committee

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lb. oz.
Abercarne & Newbridge, near Newport, Monmouthshire.	Quartz and siliceous grains, moderately fine, with argillo-siliceous cement; micaceous, and with remains of fossil plants.	Dark bluish grey.	167 15
Ball Cross	Siliceous grains, with argillo-siliceous cement; occasionally micaceous, ferruginous.	Ferruginous brown striped, and zoned in deeper tints.	.. ..
Barbadoes, Tintern, Monmouthshire.	Fine and coarse quartz, and other siliceous grains, with argillo-siliceous cement, ferruginous spots, and plates of mica.	Light greyish brown.	146 12
Binnie, Uphall, and in Linlithgowshire.	Fine quartz grains, with argillo-siliceous cement, micaceous, chiefly in planes of beds.	Brownish grey.	140 1
Bolton's Quarry, Aislaby, Yorkshire.	Moderately fine siliceous grains, with argillo-siliceous cement, plates of mica, and spots of carbon disseminated.	Warm light brown.	126 11
Bramley Fall (Old Quarry), near Leeds, Yorkshire.	Quartz grains (often coarse), and decomposed felspar, with argillo-siliceous cement, mica rare; small ferruginous spots disseminated.	Light ferruginous brown.	142 3
Calverley, Tunbridge Wells, Kent.	Fine siliceous grains, with a slightly calcareous cement.	Variegated browns.	118 1
Craigleith, Craigleith Hill, near Edinburgh.	Fine quartz grains, with a siliceous cement, slightly calcareous, occasional plates of mica.	Whitish grey	145 14
Crawbank, Barrowstones, Linlithgowshire.	Fine quartzose grains, with an argillo-siliceous cement, somewhat ferruginous; disseminated mica.	Light ferruginous brown.	129 2
Duffield Bank, Duffield, Derbyshire.	Quartz grains of moderate size and decomposed felspar, with an argillo-siliceous cement; ferruginous spots, and occasionally plates of mica.	Light brown, with dark brown and purplish tints.	132 14
Duke's Quarries, Holt Whatstandwell Bridge, Derbyshire.	Quartz grains, generally coarse, with decomposed felspar, and an argillo-siliceous cement; ferruginous spots.	Red, varied with green, brown, and grey.	144 8
Gatherley Moor, near Richmond, Yorkshire.	Quartz grains of moderate size, and an argillo-siliceous cement; ferruginous spots, and plates of mica.	Cream.	135 13
Gatton, Surrey.	Fine siliceous grains, with a calcareo-siliceous cement, containing green silicate of iron and plates of mica.	Greenish light brown.	103 1

Further memoranda of stones in

of the House of Commons (on Stones). Revised. SANDSTONE.

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
		s. d. *s. d.*	
1 to 10 tons, in thicknesses of 5 feet.	4½*d.*, or 5*s.* per ton.	1 3 to 2 3	Old churches and modern buildings in vicinity; new docks at Newport and Cardiff.
.. ..	.. ..	.. ..	At Chatsworth and Bakewell.
1 to 10 tons, thickest bed 10 to 12 feet.	Old quarry closed; new one opened in neighbourhood.		Tintern Abbey.
Bands, 14 to 18 ft. thick.	1*s.* 1*d.* to 2*s.* for largest blocks	2 9 to 3 8	New club-house in Prince's Street, Edinburgh, and numerous private houses there and in Glasgow.
100 ft. cube; top beds for house building, bottom beds for docks. Beds, 3 to 8 ft. thick.	10*d.* to 1*s.*	1 9 to 2 1	Whitby Abbey, New University Library at Cambridge, Scarborough and Bridlington Piers, Sheerness, and St. Katharine's Docks.
Up to 18 tons	.. ..	.. ..	In numerous bridges, waterworks, &c.
70 or 80 ft. and upwards to 500. Beds to 3½ ft.	4*d.* to 6*d.*	1 2 to 1 4	Upper part of new church at Tunbridge Wells, and about 100 houses, &c., at Tunbridge Wells and its vicinity.
Any practicable length and breadth, from 6 in. to 10 ft. thick.	9*d.* to 2*s.* 6*d.*, according to quality.	1 10½ to 3 7½	Used extensively in public buildings in Edinburgh; the College (1580), Registry (1774), Courts of Law, Custom House, Royal Exchange, national monuments, &c.
5 ft. thick, 6 ft. broad, 10 ft. long.	1*s.* for blocks of not more than 5 cub. ft.	2 2	A Roman bridge (A.D. 140), old church of Kinneil, of the twelfth century.
150 ft.; thickest beds about 4 ft.; half the depth brown, half white.	1*s.* 1*d.* the white stone, 9*d.* the brown stone.	.. ..	St. Mary's Bridge, Mechanics' Lecture Hall, and Bishop Ryder's Church, &c.
.. ..	On trucks, 10*d.*	At St. Pancras, 1*s.* 7*d.*	Penitentiary at Millbank, the filling-in parts of Waterloo Bridge, and Euston Station, London.
	s. d.	*s. d.*	
1 to 3 tons, a bed 12 ft. deep.	1 3 Extra large, 1 6 Random Ashlar, 1*s.* 2*d.*	2 8 to 3 0	Aste Hall, near Richmond, and Caterick bridges over the Swale, Purse Bridge over the Tees; Skelton Castle, Darlington Town Hall, Lockburn Hall, &c.
35 to 60 ft. cube, from 4 to 10 ft. long.	Quarries closed.	.. ..	Hampton Court and Windsor Castle, &c.

General use, at Masons' Prices, page 185.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state. lb.	oz.
Glammis, Forfarshire.	Siliceous grains of moderate size; cement slightly calcareous; mica abundant in planes of beds.	Purple-grey	161	2
Heddon, near Newcastle, Northumberland.	Coarse quartz grains and decomposed felspar, with an argillo-siliceous cement; ferruginous spots.	Light brown ochre.	130	11
Hollington, Staffordshire.	Quartz grains of moderate size, with an argillo-siliceous cement; plates of mica.	Light brownish grey.	133	1
Humbie.—Humbie, Linlithgowshire.	Fine quartz grains, with siliceous cement; slightly calcareous; mica chiefly in planes of beds.	Pale grey and light brown.	White, 140 grey, 135	3 13
Locharbriggs, Dumfries.	Red freestone.	Light red	..	..
Longannet, nr. Kincardine, in Perthshire.	Fine quartz grains, with siliceous cement, containing oxide of iron; a few plates of mica.	Light ferruginous brown.	131	11
Munlochy, in Rossshire.	Fine siliceous grains, with an argillo-siliceous cement; micaceous.	Red and variegated.	160	9
Mylnefield, or Kingoodie, near Dundee, in Perthshire.	Fine siliceous grains, with a calcareo-argillo-siliceous cement; micaceous in planes of beds.	Purplish grey	160	0
Park Spring, near Leeds, Yorkshire.	Fine quartz grains, and decomposed felspar, with an argillo-siliceous cement; mica chiefly in planes of beds.	Light ferruginous brown.	151	1
Pensher, nr. Houghton-le-Spring, Durham.	Coarse quartz grains, with an argillo-siliceous cement; plates of mica.	Pale whitish brown.	134	5
Pytodykes, nr. Dundee, Forfarshire.	Siliceous grains of moderate size, with a calcareo-argillo-siliceous cement; micaceous.	Purplish grey	162	8
Scotgate Head, Huddersfield, Yorkshire.	Quartz grains of moderate size, with an argillo-siliceous cement; mica in planes of beds, and occasional specks of carbon.	Light greenish grey.	158	0
Stancliffe, or Darley Dale, near Bakewell, Derbyshire.	Quartz grains of moderate size and decomposed felspar, with an argillo-siliceous cement; ferruginous spots and plates of mica.	Light ferruginous brown.	143	3
Stainton, nr. Barnard Castle, Durham.	Fine quartz grains and decomposed felspar, with an argillo-siliceous cement; ferruginous specks and some plates of mica.	Ferruginous light brown.	142	8
Whitby Company's, Aislaby, nr. Whitby, Yorkshire.	Siliceous grains of moderate size, with an argillo-siliceous cement; some plates of mica and spots of carbon disseminated.	Light brown	126	11
Tisbury	Calciferous	Greenish brown	111	2

SANDSTONE—*continued.*

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. d.	*s. d.*	
Any practicable size; thickest bed, 6 ft.	0 7 to 1 0	About 19*s.* per ton.	Glammis Castle and Inverquharity Castle, supposed of the tenth century; Cortachy Castle; and in modern buildings; Lindertis House, &c.
Beds, 4 to 12 ft. thick.	0 6 to 0 10	1 8 to 2 0	Church at Heddon, steeple, 1764; Norman chancel; columns of portico to theatre, and Grey monument at Newcastle; and nearly all the buildings, ancient and modern, in and about Newcastle.
30 to 40 ft. sq., and 8 ft. thick.	On trucks, 1*s.* to 1 6	2 6	Trentham Hall, Drayton Manor, Heath House, and various public and private buildings in Staffordshire; Town Hall, Derby; Mear Hall, Cheshire, &c.
90 cub. ft. and upwards, if required; thickest bed, 8 ft.	.. ..	.. ..	Newliston House, Kirkliston; Dundas Castle; additions to the Royal Institution; front of Surgeons' Hall, spire of Tron Church, and various other public buildings in Edinburgh; also in Glasgow.
Any practicable size.	0 8	2 3	
4 to 5 tons; thickest bed, 5 ft.	Quarry closed. See quarry in Prices	See Blair Masons'	Staadt House, Amsterdam; Exchange, Edinburgh; Tulliallan Castle, Perthshire, &c.
Of large size; beds, 2½ to 6 ft. thick.	0 5 to 0 5½	.. ..	Cathedral Church of Ross at Fortrose, A.D. 1124; Inverness old bridge, Cromwell Court, &c.
Any practicable size.	0 9 to 1 5	.. ..	Old steeple of Dundee, twelfth century, well preserved; Royal Asylum of Dundee, &c.; Bell Rock Lighthouse, Royal Asylum of Perth, Kinfauns Castle, Castle Huntly, &c.
10 to 12 ft. long; thickest bed, 2 ft. 4 in.	0 7	2 1½ to 2 5	Commercial buildings at Leeds, from the old quarry, which is of exactly similar stone to that of this quarry.
Any practicable size; thickest bed, 20 ft.	0 8½	1 7	Pensher Chapel; Scotch Church, Sunderland; Sunderland Pier, Seaham Harbour, Victoria Bridge, on the Wear, &c.
Thickest bed, 3 to 4 ft.	0 10 to 1 2	2 1 to 2 5	Extensively for the works at Dundee Harbour, &c.
Thickest bed, 3 ft. 6 in.	0 8	1 2	York Castle; Bath Hotel at Huddersfield.
Of very large size	1 6 Large blocks, 2 6	.. ..	Abbey in Darley Dale; Stancliff Hall, Birmingham; Grammar School, Birmingham, and Nottingham Railway Station, &c.
15 to 20 ft. long, 2 to 8 ft. in thickness.	On rail trucks 1 8	2 6	The Round Keep of Barnard Castle; Joint Stock Bank, and Market House, Barnard Castle.
40 × 25 ft.	0 10	1 8	Some parts of Whitby Abbey; new library at Cambridge; baths and town-hall at Whitby; cemetery at Highgate.

See prices at end.

13600

BUILDING STONES.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state. lb. oz.
Whitby Co.'s Egton Quarries, being *Arncliffe, Julian Park, Proddams,* and *Lease Rigge,* near Whitby.	.. .. ..	Pale, to dark brown.	.. ..
Whitby Co.'s Sneaton, near Whitby.	.. .. ..	.. ..	.. ..
Whitby Co.'s Newton Dale, near Whitby.	.. .. ..	.. ..	.. ..

BUILDING STONES.

Beer, near Axminster, Devonshire.	Chiefly carbonate of lime, friable, and with partial indurations.	Light tint of brown.	131 12
Chilmark and Wardour, nr. Salisbury, Wiltshire.	Carbonate of lime, with a moderate proportion of silica, and occasional grains of silicate of iron.	Light greenish brown.	153 7
Hopton Wood, near Wirksworth, Derbyshire.	Compact carbonate of lime, with encrinal fragments abundant.	Warm light grey.	158 7
Seacombe, nr. Corfe Castle, Dorsetshire.	Semi-compact carbonate of lime, with fragments of shells.	Light brown	151 0
Sutton, near Bridgend, Glamorganshire.	Compact carbonate of lime, highly crystalline.	Very light cream.	136 0
Totternhoe, near Dunstable, Bedfordshire.	Calcareous and argillaceous matter in about equal portions; structure fine.	Greenish white	116 8

BUILDING STONES.

Bolsover, near Chesterfield, Derbyshire.	Chiefly carbonate of lime and carbonate of magnesia; semi-crystalline.	Light yellowish brown.	151 11
Brodsworth, near Doncaster, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia, with sub-oolitic grains; friable.	Light brown tint.	133 10
Cadeby, near Doncaster, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia, with sub-oolitic and irregularly formed oolitic grains; friable.	Cream	126 9
Huddlestone, near Sherburne, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia; semi-crystalline.	Whitish cream	137 13

SANDSTONE—*continued.*

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. d.	*s. d.*	
Arncliffe, 15 × 10 × 9; Proddams, 10 × 8 × 8; Lease Rigge, 10 × 6 × 5.	0 11¼	1 9¼	Grosmont Abbey and Bridge; Egton Bridge; London & Birmingham Railway; Whitby and Pickering Railway.
24 × 9 × 3¼	1 1	1 11	Parts of Whitby Abbey, and a portion of the parapet of old Blackfriars Bridge.
6 ft. by 4 ft. and 18 in.	0 10	1 8	London; Lewisham Church.
LIMESTONES.			
6 ft. to 10 ft. long 5 ft. wide, and 5 ft. thick.	0 9	1 7	In the churches of the vicinity; St. Peter's Church, Exeter, in exposed parts; Colyton Church, Charmouth, &c.
Blocks to 6 tons	1 0 to 1 6	At Nine Elms 1 7¼ to 2 2	Salisbury Cathedral, Wilton Abbey, and many other ancient and modern buildings in the vicinity.
100 ft. cube; beds vary in thickness from 3 to 10 ft.	From 2 0	.. ..	At Chatsworth, Belvoir Castle, Trentham Hall, Drayton Manor, Birmingham Grammar School, &c.
The largest, 6 to 8 ft. by 2 to 3 ft. by 3 to 4 ft.	1 2¼	1 9¼	Lighthouse at Margate; the Clockhouse, Dover Pier; prison at Winchester; at the West India Docks, forty years since; lighthouse now building on the Isle of Wight, &c.
6 tons and upwards; thickest bed, 12 ft.	Quarry closed	.. ..	Dunraven Castle, Ogmond Abbey, St. Donat's Corty, Neath Abbey, and very ancient buildings in the adjoining counties.
40 cub. ft. or upwards; 5 to 6 ft. long.	1 3	2 5	Dunstable Priory Church, Luton, and many other churches in Bedfordshire and Hertfordshire; Woburn Abbey, Fonthill House, Ashridge, &c.
MAGNESIAN LIMESTONES.			
50 ft. cube, in beds from 8 in. to 2 ft. thick.	0 10	2 0	Southwell Church, and numerous buildings in the vicinity.
Thickest bed, 3 ft. 6 in.	Quarry not worked.	.. ..	Doncaster Old Church and Mansion-house, Brocklesby Hall, &c.
Central beds (the best), 4 ft. thick.	.. ..	1 10	Day and Martin's in High Holborn; almshouses at Edgware, &c.
50 to 250 cub. ft. Beds have been met with 4 ft. thick.	2 0	3 0	York Minster, Selby Cathedral, Huddlestone Hall, Sherburne Church, Westminster Hall, Galeforth Hall, &c.

BUILDING STONES.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state. lb. oz.
Jackdaw Craig, near Tadcaster, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia.	Dark cream	.. ..
Roche Abbey, near Bawtry, Yorkshire.	Chiefly carbonate of lime and carbonate of magnesia, with occasional dendritic spots of iron or manganese; semi-crystalline.	Whitish cream	139 2
Smawse, near Tadcaster, Yorkshire (Bramham Moor).	Chiefly carbonate of lime and carbonate of magnesia; slightly crystalline.	Light yellowish brown.	127 8

BUILDING STONES.

Ancaster, near Sleaford, Lincolnshire.	Fine oolitic grains, cemented by compact, and often crystalline, carbonate of lime.	Cream	139 4
Barnack Mill, near Stamford, Northamptonshire.	Carbonate of lime, compact and oolitic, with shells, often in fragments, coarsely laminated in planes of beds.	Light whitish brown.	136 12
Bath, Combe Down, nr. Bath, Somersetshire.	Chiefly carbonate of lime, in oolitic grains.	Cream	116 0
Bath, Box Ground (Pictor's Quarry), Box, s. o. Wilts.	Chiefly carbonate of lime, in moderately fine oolitic grains, with fragments of shells (weather bed).	Cream	123 0
Bath, Corsham Down, Corsham, Wilts.	Chiefly carbonate of lime, in oolitic grains.	Cream	123 0
Bath, Farleigh Down, Farleigh, Wilts.	Chiefly carbonate of lime, in oolitic grains of moderate size.	Cream	122 10
Cranmore, near Doulting, Wiltshire.	Carbonate of lime, with a few oolitic grains, and an abundance of small shells, commonly in fragments, often crystalline.	Light brown	134 4
Haydor, nr. Grantham, Lincolnshire.	Carbonate of lime, with oolitic grains, often crystalline.	Brownish cream.	133 7

MAGNESIAN LIMESTONES—*continued.*

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. d.	*s. d.*	
Beds irregular, from a few inches to 3 ft.	Blocks, 10*d.*; walling stones, 2*s.* 6*d.* per yd.	.. ..	York Minster, also for the late restorations of York Minster.
7 to 16 in. thick, large blocks uncertain.	Random, 1 9 to dimensions 2 0	.. ..	Roche Abbey Church, Tickhill Castle, and Church, and Bridge, Sandbeck Hall, Selby Hall, &c.
Largest obtained, 8·0 × 3·0 × 30.	0 7	2 1½	Hull Old Church, Ripon Minster, St. Mary's Church and the Minster at Beverley, the Minster and several churches at York, &c.

OOLITIC STONES.

3 to 5 tons, beds, 18 in.	1 2	1 9	Wollaton Hall, Belvoir Castle, Belton House, and numerous mansions and churches in Lincolnshire.
Up to 30 ft.; beds, 9 to 18 in.	1 0	2 3	Burleigh House, Peterborough Cathedral, Croyland Abbey, and the greater proportion of churches in Lincolnshire and Cambridgeshire.
12 to 80 ft. cube; thickest bed, 4½ ft.	0 10	1 4 to 1 6	Kennet and Avon Canal; Mansion in Prior Park, Bath; Exchange, Corn St., Bristol; Guildhall, Broad Street, Bristol; Blind Asylum Buildings, Park Street, Bristol.
Up to 10 tons, thickest bed, 4½ ft.	0 10	,,	Lacock Abbey, Longleat, Bowood, south front of Wilton House, Westonbirt House; Parkminster Monastery, Sussex; Knoyle House, Wilts; Military Hospital, Aldershot; and many important buildings in all parts of the country.
Up to 100 ft.; thickest bed, 4½ ft.	0 10	,,	Grosvenor Hotel, Victoria Station, London; generally used for interior ch. work, such as columns, pulpits, fonts, screens, and all interior carving and decorative purposes.
4 to 80 ft. cube; several beds, the deepest about 4 ft.	0 10	,,	Buckingham New Palace; St. James's Sq., Bath, &c.; generally used for interior church work.
Of large size; the thickest beds will work 20 in.	0 9	1 5	Cathedral of Wells, Glastonbury Abbey, &c.
14 ft. × 3 ft. × 4 ft.	1 2	1 9	Lincoln Cathedral, Boston Church, Grantham Church, Newark Church, and most of the churches in the neighbourhood, and in the lower part of Lincolnshire; Culverthorpe House, Belvoir Castle, &c.

Name of Quarry, and where situated.	Component parts of Stone.	Colour.	Weight of a cubic foot in its ordinary state.
			lb. oz.
Ketton, in Rutlandshire, near Stamford.	Oolitic grains of moderate size, slightly cemented by carbonate of lime.	Dark cream colour.	128 5
Portlnd.(Trade Qry.), Isld. of Portland.	Oolitic carbonate of lime, with a few fragments of shells.	Whitish brown	.. ..
Portland (King Barrow, E. End Qry.), adjoining Waycroft, Isld. of Portland.	Ditto	Ditto	.. ..
Portland (Vern-st. Qry.), I. of Portlnd.	Ditto	Ditto	134 10 top bed.
Portland (Castle's Qry.), I. of Portlnd.	Ditto	Ditto	.. ..
Portland (Waycroft Quarries), Island of Portland.	Oolitic carbonate of lime, with disseminated fragments of shells.	Whitish brown.	135 8 top bed.
Portland (Maggott Quarry).	Oolitic carbonate of lime, with fragments of shells.	Ditto	.. ..
Portland (Grove Quarry, Bowers).	Ditto	Ditto	147 10 best bed, 149 5 carf.
Portland (Grove Quarry, Red Croft).	Ditto	Ditto	.. ..
Taynton, or Teynton, near Burford, Oxon.	Carbonate of lime, partly oolitic and friable, with very small fragments of shells, irregularly laminated.	Streaky brown	135 15
Wass, near Thirsk, Yorkshire.	Compact carbonate of lime, with oolitic grains and an argillo-calcareous cement; carbon disseminated.	Brown	141 11 soft, 162 8 hard.
Windrush, nr. Burford, Gloucestershire.	Fine oolitic grains, with calcareous cement, and a few fragments of shells.	Cream	118 2 soft, 125 15 hard.

OOLITIC STONES—*continued.*

Weight of Block, and the thickness procurable.	Price per cubic foot at the Quarry.	Price per cubic foot, delivered in London.	Where used.
	s. d.	*s. d.*	
In blocks up to 9 ft. long, 7 ft. wide, and 5 ft. 6 in. thick.	2 0 to 3 6	.. ..	Many of the ancient and modern buildings at Cambridge; also in the modern works of Peterborough and Ely Cathedral, and at St. Dunstan's New Church in London.
Any practicable size.	1 3 to 2 1	2 3	Various public buildings in London.
Ditto	Ditto	Ditto	Ditto.
	[See Masons' Prices, p.196.]		
Ditto	Ditto	Ditto	Ditto.
Ditto	Ditto	Ditto	Ditto.
Ditto	1 3 to 2 1	2 3	Goldsmiths' Hall, Reform Club House, and other public buildings in London.
Ditto	Ditto	Ditto	Various public buildings in London.
	[See Masons' Prices, p. 196.]		
Ditto	Ditto	Ditto	St. Paul's Cathedral, and several churches in London, built during the reign of Queen Anne.
Ditto	Ditto	Ditto	St. Paul's Cathedral, and many churches in London, of Queen Anne's reign.
Any practicable size; thickest bed, about 7 ft.	0 10 to 1 0	2 4	Blenheim, Cornbury Park, Barrington Park, the interior of St. Paul's, and many other churches in London and Oxford, and in various bridges in Oxfordshire.
Beds variable, about 16 in.	.. ..	.. ..	West front and a large proportion of Byland Abbey.
5 to 40 ft.; thickest bed, 2 ft. 6 in.	0 8	2 7	Windrush Church, Barrington House, and all the old buildings within many miles of the quarry.

Table of Weight and Labour on Building Stones.

Materials.	Weight per Cubic Foot in Lbs.	Labour in proportion to Portland.
Oolites.		
Portland	147	1·0
Ancaster	139½	0·6
Bath	123	0·5
Doulting	134	0·75
Haydor	133½	0·5
Ketton	128½	0·65
Taynton	136	0·9
Sandstones.		
Abercarne and Newbridge	168	1·42
Barbados	146½	1·23
Binnie	140	1·0
Craigleith	146	—
Duke's Quarry, Derby	144	1·1
Gatton	103	0·7
Giffneuch	143½	0·85
Heddon	130½	1·1
Park Spring	151	1·23
Scotgate Head	158	1·2
Whitby	126½	0·75 to 0·95
Limestones.		
Chilmark or Wardour	153½	1·0 hard 0·6 soft
Seacombe	151	1·16
Totternhoe	116½	0·47
Magnesian Limestones.		
Brodsworth	133½	0·86
Huddleston	137½	0·95
Roche Abbey	139	1·0

TABLE OF THE WEIGHT REQUIRED TO CRUSH CUBES OF STONE.

(From experiments. From Parliamentary Commissioners' Report, &c.).

Materials.	Specific Gravity.	Cracking Weight.	Crushing Weight.
		lb.	lb.
I. Granites (2-in. cubes).			
Aberdeen (blue)	—	—	10,363
Dartmoor	—	—	12,175
Haytor	—	—	13,865
Herm	—	—	14,873
Penrhyn	—	—	7,728
Peterhead (blue)	—	—	9,666
II. Limestones (2-in. cubes).			
Marble (white)..	—	—	9,580
Bolsover	2,316	19,831	30,147·5
Bramham Moor	2,008	10,666·5	23,649·7
Brodsworth	2,093	7,366·5	18,416·5
Cadeby	1,951	5,666·5	6,516·5
Chilmark	2,410	10,285	25,500
Wardour	—	—	17,484
Hamhill	2,260	6,233	16,149
Hildenley	2,098	17,565·5	19,266·5
Huddlestone	2,147	9,633	17,283
Jackdaw Craig	2,070	10,666·5	18,903
Park Nook..	2,138	7,366·5	17,283
Roche Abbey	2,134	6,800	15,583
Totternhoe	1,891	3,966	7,700
III. Oolites (2-in. cubes).			
Ancaster	2,182	6,800	9,350
Barnack	2,090	4,533	7,083
Haydor	2,040	4,533	7,083
Ketton	2,645	6,233	10,285
Ketton rag..	2,490	14,166·5	35,983
Portland(Waycroft Quarry)	2,145	8,500	15,583
Box	1,839	5,100	5,950

TABLE OF THE WEIGHT REQUIRED TO CRUSH CUBES OF STONE—*continued.*

Materials.	Specific Gravity.	Cracking Weight.	Crushing Weight.
		lb.	lb.
IV. Sandstones (2-in. cubes).			
Bramley Fall	2,506	—	6,053
Binnie	2,194	10,766·5	20,116·5
Craigleith	2,266	17,000	31,449·5
„	2,452	—	5,480
Darley Dale, Stancliffe ..	2,628	26,014·5	28,333
Derby	—	—	3,110
Dundee	—	—	6,490
Giffneuch	2,230	13,698	19,266·5
Heddon	2,229	7,366·5	15,866
Hookstone	2,253	17,566·5	23,233
Kenton	2,247	13,698	19,831
Mansfield, Lindley's, or Fisher Bros. (red)..	2,338	8,038	20,397
Ditto (white)	2,227	10,285	20,963·5
Morley Moor	2,053	6,235	19,833
Park Spring	2,321	15,866	30,316
Redgate	2,239	15,383	23,649·7
Stanley	2,227	10,285	23,883

RESULTS OF EXPERIMENTS to ascertain the Thrusting Stress of 12 Specimens of BEER FREESTONE, from the Beer Freestone Co.'s Quarries near Seaton, Devon.

Following are the Mean Tests of 3 Specimens of each dimension:

Height.	Dimensions.	Slightly cracked.			Crushed.		
		Stress.	Per sq. in.	Per sup. ft.	Stress.	Per sq. in.	Per sup. ft.
inches.	inches.	lbs.	lbs.	tons.	lbs.	lbs.	tons.
6	6 × 6 × 6	75,880	2,106	135·4	90,880	2,522	162·1
12	12 × 6 × 6	69,706	1,938	124·6	84,713	2,355	151·4
18	18 × 6 × 6	70,156	1,933	124·3	87,993	2,424	155·8
24	24 × 6 × 6	66,650	1,874	120·5	83,656	2,352	151·2

Beer Freestone is delivered at Nine Elms at 1*s.* 4*d.* per cub. ft. Blocks up to 120 ft. cube, and 5 ft. thick, if specially ordered.

EXPERIMENTS ON CORSEHILL STONE.

Dimensions.	Base Area.	Cracked slightly.			Crushed, Steelyard dropped.		
		Stress.	Per sq. in.	Per sq. ft.	Stress.	Per sq. in.	Per sq. ft.
inches.	sq. in.	lbs.	lbs.	tons.	lbs.	lbs.	tons.
5·90 5·90×5·92	34·92	298,620	8551	549·9	349,180	9999	643·0
5·98 5·99×5·98	35·82	263,180	7347	472·4	285,840	7979	513·1
6·00 5·98×5·98	35·76	200,800	5615	361·0	207,310	5797	372·7
Mean..		254,200	7171	461·1	280,776	7925	509·6

CORSHAM BATH STONE—MONK'S PARK QUARRY.

Results of experiments to ascertain the resistance to Thrusting Stress of three 6-in. cubes of Stone.

Test No.	Description.	Dimensions.	Base Area.	Cracked Slightly.			Crushed, Steelyard dropped.		
				Stress.	Per Sq. In.	Per Sq. Ft.	Stress.	Per Sq. In.	Per Sq. Ft.
		inches.	sq. in.	lbs.	lbs.	tons.	lbs.	lbs.	tons.
3381	Corsham Bath Stone from the "Monk's Park Quarry."	5·85 / 6·00×6·00	36·00	108,400	3,011	193·6	118,150	3,281	210·9
3382		6·00 / 6·00×6·00	36·00	96,750	2,684	172·6	101,400	2,816	181·0
3383		5·98 / 6·00×6·00	36·00	84,450	2,345	150·8	96,640	2,684	172·6
			Mean	96,533	2,680	172·3	105,397	2,972	188·1

Bedded between pieces of Pine ½ inch thick.

ANALYSIS OF CORSHAM BATH STONE from Monk's Park Quarry.

Carbonate of lime	97·2 per cent.
Oxide of iron and alumina	1·6 ,,
Silica	1·0 ,,
Carbonate of magnesia	0·2 ,,
	100·0

RESULTS OF EXPERIMENTS TO ASCERTAIN THE RESISTANCE TO THRUSTING STRESS OF FOUR FOUR-INCH CUBES OF STONE RECEIVED FROM THE MANINGHEN STONE COMPANY.

Test No.	Description.	Dimension.	Base Area.	Cracked slightly.			Crushed. Steelyard dropped.		
				Stress.	Per sq. in.	Per sq. ft.	Stress.	Per sq. in.	Per sq. ft.
M.		inches.	lbs.	lbs.	lbs.	tons.	lbs.	lbs.	tons.
4105	Maninghen Stone ..	4·00, 4·04, 4·02	16·24	176,100	10,843	697·2	195,140	12,016	772·7
4103	Ditto ..	3·98, 4·02, 3·98	15·99	138,200	8,642	555·7	159,230	9,958	640·3
			Mean	159,050	9,845	633·0	174,100	10,770	693·0

Bedded between pieces of pine ½ inch thick.

CRUSHING STRESS OF BRICKS FROM COPLAWHILL.

	Tons.
No. 1 .. 9 × 4½ × 2½ brick	76
„ 2 .. 9 × 4½ × 2½ „	60
„ 3 .. 9 × 4½ × 3½ „	27

STRENGTH OF MATERIALS. (Experiments. Kirkaldy.)

BRICKS, IN PIERS FOUR COURSES HIGH.

Description of Bricks.	Size of Pier in Bricks.	Mortar.	Falling slightly. Tons per foot super.	Entirely crushed. Tons per foot super.
Common stock, recessed	1½ by 1½	Lias lime	17	27
„ „	„	„	21	30
Red bricks, machine-made	„	„	20	40
„ hand-made ..	„	„	20	36
Galt	„	Roman cement	24	59
„	1 by 1	„	54	72
Clark's Sudbury, machine	„	Portland	49	76
Uxbridge red, hand-made	„	„	44	53

STATEMENT OF THE CRUSHING STRESS OF VARIOUS SAMPLES OF BUILDING MATERIAL, tested by hydraulic ram 20 in. diameter. Area of ram, 314 sq. in. From tests made at New Municipal Buildings, Glasgow.

FREESTONE ROCK IN 3-INCH CUBES.

Quarry.	Tons per Square Inch.
Polmaise (dark brown)	1·83
„ (light brown)	2·84
Plean (No. 1)	3·77
„ (No. 2)	3·77
Dunmore (coarse grain)	3·85
„ (medium)	4·55
„ (fine)	5·33

STONE CUBES OF TWO INCHES, BEDDED ON SHEET LEAD.

Description.	Failing slightly. Tons per foot super.	Entirely crushed. Tons per foot super.
De Lank granite, Cornish.. ..	283	363
" "	279	—
" "	349	377
Guernsey	276	830
"	761	1150
Cheesewring, Cornish	295	403
" "	194	322
Portland	106	155

DOULTON FREESTONE (Quarry, Shepton Mallet, Somerset).

Experiments on Strength.

Size of Block.	Tested against the Bed.		
	Cracked with	Crushed with	Crushing Weight per Square Inch.
in. in. in.	lb.	lb.	lb.
6 × 6 × 6	75,240	89,180	2,441
6 × 6 × 12	—	79,620	2,189
6 × 6 × 18	—	70,870	1,952
6 × 6 × 24	62,270	65,890	1,836
	Tested on the Bed.		
6 × 6 × 6	—	89,380	2,490
6 × 6 × 12	69,240	83,620	2,265
6 × 6 × 18	72,770	79,850	2,174
6 × 6 × 24	—	77,040	2,105

STRUTS OF WROUGHT IRON. (Rankine.)

D = Diameter in inches.
L = Length in ,,
S = Sectional area of metal in inches.
W = Crushing weight in tons.
When fixed at the ends—

$$W = 16\,S \div 1 + \frac{L^2}{a\,D^2}.$$

a = 3000 for a hollow tube.
a = 1000 for a cross with equal arms.
a = 1000 for an angle with equal sides.

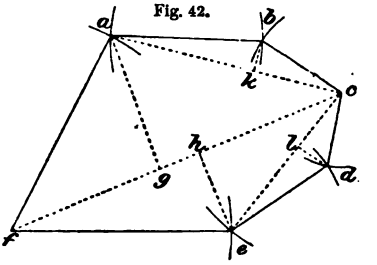
When hinged at the ends, take $\frac{a}{4}$.

SURVEYING.

To take a plan of site and to calculate the contents:—

Let Fig. 42 be the plan of site.

Fig. 42.



To take the measurements:—

Fix poles at $a\ b\ c\ d\ e\ f$. Commence at c, and measure the distance $c\ f$, taking the perpendiculars $h\ e$ and $g\ a$; then measure $a\ c$ and $c\ e$, taking the perpendiculars $k\ b$ and $l\ d$; and then measure the sides $a\ b\ c\ d$, &c.

To plot the plan:—

1. Draw any line, and mark off on it the length of $c\ f$.

2. From c as centre, with the distance $c\ e$ as radius, describe an arc; and from f as centre, with the distance $f\ e$ as radius, intersect the arc; the intersection will give the point e.

3. From c and f, as centres with the distance $f\ a$ and $c\ a$ respectively, draw arcs intersecting to find the point a as before.

4. From a and c as centres with the distance $a\ b$ and $c\ b$ respectively as radius, find the point b in the same way.

5. From c and e as centres with the distance $c\ d$ and $e\ d$, find the point d as before, which will complete the outline of the plan.

6. Draw lines from the points $a\ b$, $b\ c$, &c., as shown.

To find the area:—

1. Multiply the length $c\ f$ by the lengths of $h\ e$ and $g\ a$ added together.
2. Multiply the length $a\ c$ by the perpendicular $k\ b$.
3. Multiply the length $c\ e$ by the perpendicular $l\ d$.
4. Add the three products, and half the sum will be the area.

Example:—

Let $c\ f$ = 100 feet.
$g\ a$ = 40 „
$h\ e$ = 20 „
$a\ c$ = 70 „
$k\ b$ = 10 „
$c\ e$ = 50 „
$l\ d$ = 12 „

Then $c\ f \times \frac{1}{2}(h\ e + g\ a) = 100 \times 30 =$ 3000
$\frac{1}{2}\ a\ c \times k\ b = 70 \times 10 =$ 350
$\frac{1}{2}\ c\ e \times l\ d = 50 \times 12 =$ 300

Area = 3650

SURVEYORS' FEES.

Compensation Claims.

Known as "Ryde's" Scale, sometimes called "Clutton's." Railway Companies and other Corporations taking land compulsorily, almost invariably allow to the vendor, towards his surveyor's costs, according to this scale; sometimes more, in cases of peculiar difficulty. This scale is also used in taxing costs against the Company after a reference or an inquisition before a Jury

Compensation Claims. "Ryde's" Scale.

£	Gs.	£	Gs.	£	Gs.	£	Gs.
100	5	2,200	24	5,200	39	8,200	54
200	7	2,400	25	5,400	40	8,400	55
300	9	2,600	26	5,600	41	8,600	56
400	11	2,800	27	5,800	42	8,800	57
500	13	3,000	28	6,000	43	9,000	58
600	14	3,200	29	6,200	44	9,200	59
700	15	3,400	30	6,400	45	9,400	60
800	16	3,600	31	6,600	46	9,600	61
900	17	3,800	32	6,800	47	9,800	62
1,000	18	4,000	33	7,000	48	10,000	63
1,200	19	4,200	34	7,200	49	11,000	68
1,400	20	4,400	35	7,400	50	12,000	73
1,600	21	4,600	36	7,600	51	..	..
1,800	22	4,800	37	7,800	52	..	..
2,000	23	5,000	38	8,000	53	..	..

Scale of Surveyors' Fees for Parochial Assessment Valuations.

This scale applies to occasional assessment of the annual value of hereditaments which have to be made for Overseers, Assessment Committees, and Ratepayers; each hereditament being charged a separate fee. When a whole parish or district is assessed, a charge of 1¼ per cent. on the total gross assessments is made.

Amount of Gross Assessment.	Fee.
Not Exceeding .. £100	5 Guineas.
„ .. 200	9 „
„ .. 300	12 „
„ .. 400	14 „
„ .. 500	15 „
„ .. 600	16 „
„ .. 700	17 „
„ .. 800	18 „
„ .. 900	19 „
„ .. 1,000	20 „
„ .. 1,100	21 „
„ .. 1,200	22 „
„ .. 1,300	23 „
„ .. 1,400	24 „
„ .. 1,500	25 „
„ .. 1,600	26 „
„ .. 1,700	27 „
„ .. 1,800	28 „
„ .. 1,900	29 „
„ .. 2,000	30 „
Above £2,000 up to 5,000	Add One Guinea to the last-mentioned fee for every additional £100.
Above 5,000	1¼ per cent.

SYMBOLISM.

The Holy Apostles.

S. Peter. With a key; or two keys with different wards.

S. Andrew. Leaning on the cross called from him.

S. John Evangelist. With a chalice, in which is a winged serpent. (In this case the eagle is never represented.)

S. Bartholomew. With a flaying knife.

S. James the Less. With a fuller's staff, bearing a small square banner.

S. James the Greater. With a pilgrim's hat, staff, and cockle-shell.

S. Thomas. With an arrow; or with a long staff.

S. Simon. With a long saw.

S. Jude. With a club.

S. Mathias. With a hatchet.

S. Philip. Leaning on a spear; or with a long cross in the shape of a T.

S. Matthew. With a knife or dagger.

S. Paul. With elevated sword.

S. John Baptist. With an Agnus Dei.

S. Stephen. With stones in his lap.

S. Hilary. A bishop, with three books.

S. Fabian. Kneeling at the block, the triple crown by his side.

S. Agnes. With a lamb at her feet.

S. Blaise. Holding a woolcomb; or with a woman at his feet, offering a pig.

S. Agatha. Her breast torn by pincers.

S. David. With pall and crozier, preaching on a hill.

S. Perpetua. With a child at her breast, surrounded by flames.

S. Gregory. A book in one hand, the triple crozier in the other, and a triple crown.

S. Richard. A chalice at his feet.

S. Alphege. An archbishop, with a heap of stones in his chesible.

S. Dunstan. An archbishop, with a harp in his hand.

S. Boniface. A bishop, laying an axe to the root of an oak.

S. Margaret. With a crozier in her hand, trampling on a dragon.

S. Mary Magdalene. With the alabaster box, and with loose long hair.

S. Anne. Teaching the Blessed Virgin Mary to read: her finger generally points to the words, "Radix Jesse floruit."

S. Laurence. With a gridiron.

S. Giles. A hind, with an arrow piercing her neck, standing on her hind feet, and resting her fore feet on the lap of the saint.

S. Edmund. Fastened to a tree, and pierced with arrows; the royal crown on his head.

S. Enurchus. A dove lighting on his head.

S. Martin. Giving half of his cloak to a beggar.

S. Britius. With a young child in his arms.

S. Cecilia. With her organ.

S. Catherine. With her wheel and a sword.

S. Clement. With an anchor.

S. Nicolas. With three naked children in a tub, in which rests the end of his pastoral staff.

S. Faith. With a bundle of rods. Generally virgins not martyrs hold lamps; if martyrs, roses and lilies; martyrs have palm branches; confessors have lilies; prophets, wheels.

TABLE OF SQUARES, CUBES, SQUARE ROOTS, AND CUBE ROOTS.

No.	Square.	Cube.	Square Root.	Cube Root.	No.	Square.	Cube.	Square Root.	Cube Root.
1	1	1	1·0	1·0	51	2601	132651	7·14143	3·7084
2	4	8	1·41421	1·2599	52	2704	140608	7·21110	3·7325
3	9	27	1·73205	1·4423	53	2809	148877	7·28011	3 7563
4	16	64	2·0	1·5874	54	2916	157464	7·34847	3·7798
5	25	125	2·23607	1·7099	55	3025	166375	7·4162	3·8029
6	36	216	2·44949	1·8171	56	3136	175616	7·48332	3·8259
7	49	343	2·64575	1·9129	57	3249	185193	7·54983	3·8485
8	64	512	2·82843	2·0	58	3364	195112	7·61577	3·8709
9	81	729	3·0	2·0801	59	3481	205379	7·68115	3·8930
10	100	1000	3·16228	2·1544	60	3600	216000	7·74597	3·9149
11	121	1331	3·31663	2·2239	61	3721	226981	7·81025	3·9365
12	144	1728	3·46410	2·2894	62	3844	238328	7·87401	3·9579
13	169	2197	3·60555	2·3513	63	3969	250047	7·93725	3·9791
14	196	2744	3·74166	2·4101	64	4096	262144	8·0	4·0
15	225	3375	3·87298	2·4662	65	4225	274625	8·06226	4·0207
16	256	4096	4·0	2·5198	66	4356	287496	8·12404	4·0412
17	289	4913	4·12311	2·5713	67	4489	300763	8·18535	4·0615
18	324	5832	4·24264	2·6207	68	4624	314432	8·24621	4·0817
19	361	6859	4·35890	2·6684	69	4761	328509	8·30662	4·1016
20	400	8000	4·47214	2·7144	70	4900	343000	8·36660	4·1213
21	441	9261	4·58258	2·7589	71	5041	357911	8·42615	4·1408
22	484	10648	4·69042	2·8020	72	5184	373248	8·48528	4·1602
23	529	12167	4·79583	2·8439	73	5329	389017	8·54400	4·1793
24	576	13824	4·89898	2·8845	74	5476	405224	8·60233	4·1983
25	625	15625	5·0	2·9240	75	5625	421875	8·66025	4·2172
26	676	17576	5·09902	2·9625	76	5776	438976	8·71779	4·2358
27	729	19683	5·19615	3·0	77	5929	456533	8·77496	4·2543
28	784	21952	5·29150	3·0366	78	6084	474552	8·83176	4·2727
29	841	24389	5·38517	3·0723	79	6241	493039	8·88819	4·2908
30	900	27000	5·47723	3·1072	80	6400	512000	8·944	4·3089
31	961	29791	5·56776	3·1414	81	6561	531441	9·0	4·3267
32	1024	32768	5·65685	3·1748	82	6724	551368	9·05589	4·3445
33	1089	35937	5·74456	3·2075	83	6889	571787	9·11043	4·3621
34	1156	39304	5·83095	3·2396	84	7056	592704	9·16515	4·3795
35	1225	42875	5·91608	3·2711	85	7225	614125	9·21955	4·3968
36	1296	46656	6·0	3·3019	86	7396	636056	9·27362	4·4141
37	1369	50653	6·08276	3·3322	87	7569	658503	9·32738	4·4314
38	1444	54872	6·16441	3·3619	88	7744	681472	9·38083	4·4479
39	1521	59319	6·245	3·3912	89	7921	704969	9·43398	4·4647
40	1600	64000	6·32456	3·4199	90	8100	729000	9·48683	4·4814
41	1681	68921	6·40312	3·4482	91	8281	753571	9·53939	4·4979
42	1764	74088	6·48074	3·4760	92	8464	778688	9·59166	4·5144
43	1849	79507	6·55744	3·5034	93	8649	804357	9·64365	4·5307
44	1936	85184	6·63325	3·5303	94	8836	830584	9·69536	4·5468
45	2025	91125	6·70820	3·5569	95	9025	857375	9·74679	4·5629
46	2116	97336	6·78230	3·5830	96	9216	884736	9·79796	4·5789
47	2209	103823	6·85566	3·6088	97	9409	912673	9·84886	4·5947
48	2304	110592	6·92820	3·6342	98	9604	941192	9·89949	4·6104
49	2401	117649	7·0	3·6593	99	9801	970299	9·94987	4·6261
50	2500	125000	7·07107	3·6840	100	10000	1000000	10·0	4·6416

TABLE OF SQUARES, CUBES, SQUARE ROOTS, AND CUBE ROOTS—*continued.*

No.	Square.	Cube.	Square Root.	Cube Root.	No.	Square.	Cube.	Square Root.	Cube Root.
101	10201	1030301	10·04988	4·6570	151	22801	3442951	12·28821	5·3251
102	10404	1061208	10·09951	4·6723	152	23104	3511008	12·32883	5·3368
103	10609	1092727	10·14889	4·6875	153	23409	3581577	12·36932	5·3485
104	10816	1124864	10·19804	4·7027	154	23716	3652264	12·40967	5·3601
105	11025	1157625	10·24695	4·7177	155	24025	3723875	12·44981	5·3717
106	11236	1191016	10·29563	4·7326	156	24336	3796416	12·49000	5·3832
107	11449	1225043	10·34408	4·7475	157	24649	3869893	12·52996	5·3947
108	11664	1259712	10·39231	4·7622	158	24964	3944312	12·56981	5·4061
109	11881	1295029	10·44031	4·7769	159	25281	4019679	12·60952	5·4175
110	12100	1331000	10·48809	4·7914	160	25600	4096000	12·64911	5·4288
111	12321	1367631	10·53565	4·8059	161	25921	4173281	12·68858	5·4401
112	12544	1404928	10·58301	4·8203	162	26244	4251528	12·72792	5·4514
113	12769	1442897	10·63015	4·8346	163	26569	4330747	12·76715	5·4626
114	12996	1481544	10·67708	4·8488	164	26896	4410944	12·80625	5·4737
115	13225	1520875	10·72381	4·8629	165	27225	4492125	12·84523	5·4848
116	13456	1560896	10·77033	4·877	166	27556	4574296	12·88410	5·4959
117	13689	1601613	10·81665	4·8909	167	27889	4657463	12·92285	5·5069
118	13924	1643032	10·86278	4·9049	168	28224	4741632	12·96145	5·5178
119	14161	1685159	10·90871	4·9187	169	28561	4826809	13·00000	5·5288
120	14400	1728000	10·95445	4·9324	170	28900	4913000	13·03841	5·5397
121	14641	1771561	11·0	4·9460	171	29241	5000211	13·07670	5·5505
122	14884	1815848	11·04536	4·9597	172	29584	5088448	13·11488	5·5613
123	15129	1860867	11·09053	4·9732	173	29929	5177717	13·15295	5·5721
124	15376	1906624	11·13552	4·9866	174	30276	5268024	13·19091	5·5828
125	15625	1953125	11·18034	5·0	175	30625	5359375	13·22876	5·5935
126	15876	2000376	11·22497	5·0133	176	30976	5451776	13·26649	5·6041
127	16129	2048383	11·26942	5·0265	177	31329	5545233	13·30414	5·6147
128	16384	2097152	11·3137	5·0397	178	31684	5639752	13·34167	5·6253
129	16641	2146689	11·35781	5·0528	179	32041	5735339	13·37990	5·6358
130	16900	2197000	11·4018	5·0652	180	32400	5832000	13·41641	5·6462
131	17161	2248091	11·44552	5·0788	181	32761	5929741	13·45362	5·6567
132	17424	2299968	11·48912	5·0916	182	33124	6028568	13·49074	5·6671
133	17689	2352637	11·53266	5·1045	183	33489	6128487	13·52775	5·6774
134	17956	2406104	11·57583	5·1173	184	33856	6229504	13·56466	5·6877
135	18225	2460375	11·61895	5·1299	185	34225	6331625	13·60147	5·6980
136	18496	2515456	11·6619	5·1426	186	34596	6434856	13·63818	5·7083
137	18769	2571353	11·70461	5·1551	187	34969	6539203	13·67479	5·7185
138	19044	2628072	11·74734	5·1676	188	35344	6644672	13·71131	5·7287
139	19321	2685619	11·78982	5·1801	189	35721	6751269	13·74773	5·7388
140	19600	2744000	11·8322	5·1925	190	36100	6859000	13·78405	5·7489
141	19881	2803221	11·87434	5·2048	191	36481	6967871	13·82028	5·7589
142	20164	2863288	11·9164	5·2171	192	36864	7077888	13·85641	5·7690
143	20449	2924207	11·9583	5·2293	193	37240	7189517	13·89244	5·7790
144	20736	2985984	12·0	5·2415	194	37636	7301384	13·92839	5·7889
145	21025	3048625	12·0416	5·2536	195	38025	7414875	13·96424	5·7989
146	21316	3112136	12·08305	5·2656	196	38416	7529536	14·000	5·8088
147	21609	3176523	12·12486	5·2776	197	38809	7645373	14·03567	5·8186
148	21904	3241792	12·16553	5·2896	198	39204	7762392	14·07125	5·8285
149	22201	3307949	12·20656	5·3015	199	39601	7880599	14·10674	5·8383
150	22500	3375000	12·24745	5·3133	200	40000	8000000	14·14214	5·8480

TABLE OF SQUARES, CUBES, SQUARE ROOTS, AND CUBE ROOTS—*continued.*

No.	Square.	Cube.	Square Root.	Cube Root.	No.	Square.	Cube.	Square Root.	Cube Root.
201	40401	8120601	14·1775	5·8578	221	48841	10793861	14·8661	6·0459
202	40804	8242408	14·2127	5·8675	222	49284	10941048	14·8997	6·0551
203	41209	8365427	14·2478	5·8771	223	49729	11089567	14·9332	6·0641
204	41616	8489664	14·2829	5·8868	224	50176	11239424	14·9666	6·0732
205	42025	8615125	14·3178	5·8964	225	50625	11390625	15·0	6·0822
206	42436	8741816	14·3527	5·9059	226	51076	11543176	15·0333	6·0912
207	42849	8869743	14·3875	5·9155	227	51529	11697083	15·0665	6·1002
208	43264	8998912	14·4222	5·9249	228	51984	11852352	15·0997	6·1091
209	43681	9129329	14·4568	5·9345	229	52441	12008989	15·1327	6·1180
210	44100	9261000	14·4914	5·9439	230	52900	12167000	15·1658	6·1269
211	44521	9393931	14·5258	5·9533	231	53361	12326391	15·1987	6·1358
212	44944	9528128	14·5602	5·9627	232	53824	12487168	15·2315	6·1446
213	45369	9663597	14·5945	5·9721	233	54289	12649337	15·2643	6·1535
214	45796	9800344	14·6287	5·9814	234	54756	12812904	15·2971	6·1622
215	46225	9938375	14·6629	5·9907	235	55225	12977875	15·3297	6·1710
216	46656	10077696	14·6969	6·0	236	55696	13144256	15·3623	6·1797
217	47089	10218313	14·7309	6·0092	237	56169	13312053	15·3949	6·1885
218	47524	10360232	14·7648	6·0185	238	56644	13481272	15·4272	6·1972
219	47961	10503459	14·7986	6·0277	239	57121	13651919	15·4596	6·2058
220	48400	10648000	14·8324	6·0368	240	57600	13824000	15·4919	6·2145

To find the Fourth Root.

Extract the square root of the number, and of that root extract the square root again, then the last is the fourth root of the number.

To find the Sixth Root.

Find the cube root of the number, and of that root extract the square root, and then the last is the sixth root of the number.

THICKNESS OF WALLS.

London Building Act, 1894 (*See page* 376).

Diameter.	Circum.	Area.	Diameter.	Circum.	Area.	Diameter.	Circum.	Area.
1	3·1416	0·7854	51	160·22	2042·8	101	317·30	8011·9
2	6·2832	3·1416	52	163·36	2123.7	102	320·44	8171·3
3	9·4248	7·0686	53	166·50	2206.2	103	323·58	8332·8
4	12·566	12·5664	54	169·65	2290·2	104	326·73	8494·9
5	15·708	19·6350	55	172·79	2375·8	105	329·87	8659·0
6	18·850	28·2743	56	175·93	2463·0	106	333·01	8824·7
7	21·991	38·4845	57	179·07	2551·8	107	336·15	8992·0
8	25·133	50·2655	58	182·21	2642·1	108	339·29	9160·9
9	28·274	63·6173	59	185·35	2734·0	109	342·43	9331·3
10	31·416	78·54	60	188·50	2827·4	110	345·58	9503·3
11	34·558	95·03	61	191·64	2922·5	111	348·72	9676·9
12	37·699	113·10	62	194·78	3019·1	112	351·86	9852.0
13	40·841	132·73	63	197·92	3117·2	113	355.00	10028·8
14	43·982	153·94	64	201·06	3217·0	114	358·14	10207·0
15	47·124	176·71	65	204·20	3318·3	115	361·28	10386·9
16	50·265	201·06	66	207·35	3421·2	116	364·42	10568.3
17	53·407	226·98	67	210·49	3525·7	117	367·57	10751·3
18	56·549	254·47	68	213·63	3631·7	118	370·71	10935·9
19	59·690	283·53	69	216·77	3739·3	119	373·85	11122·0
20	62·832	314·16	70	219·91	3848·5	120	376·99	11310
21	65·973	346·36	71	223·05	3959·2	121	380.18	11499
22	69·115	380·13	72	226·19	4071.5	122	383·27	11690
23	72·257	415·48	73	229·34	4185·4	123	386·42	11882
24	75·398	452·39	74	232·48	4300·8	124	389·56	12076
25	78·540	490·87	75	235.62	4417·9	125	392·70	12272
26	81·681	530·93	76	238·76	4536·5	126	395·84	12469
27	84·823	572·56	77	241·90	4656·6	127	398·98	12668
28	87·965	615·75	78	245·04	4778·4	128	402·12	12868
29	91·106	660·52	79	248·19	4901·7	129	405 27	13070
30	94·248	706·86	80	251·33	5026·6	130	408·41	13273
31	97·389	754·77	81	254·47	5153·0	131	411·55	13478
32	100·53	804·25	82	257·61	5281·0	132	414·69	13685
33	103·67	855·30	83	260·75	5410·6	133	417·83	13893
34	106·81	907·92	84	263·89	5541·8	134	420·97	14103
35	109·96	962·11	85	267.04	5674·5	135	424·12	14314
36	113·10	1017·88	86	270·18	5808·8	136	427.26	14527
37	116·24	1075·21	87	273·32	5944·7	137	430·40	14741
38	119·38	1134·11	88	276·46	6082·1	138	433·54	14957
39	122·52	1194·59	89	279·60	6221·1	139	436·68	15175
40	125·66	1256·63	90	282·74	6361·7	140	439·82	15394
41	128·81	1320·25	91	285·88	6503·9	141	442·96	15615
42	131·95	1385·44	92	289·03	6647·6	142	446·11	15837
43	135·09	1452·20	93	292·17	6792·9	143	449·25	16061
44	138·23	1520·52	94	295·31	6939·8	144	452·39	16286
45	141·37	1590·43	95	298·45	7088·2	145	455·53	16513
46	144·51	1661·90	96	301·59	7238·2	146	458·67	16742
47	147·65	1734·94	97	304·73	7389·8	147	461·81	16972
48	150·80	1809·55	98	307·88	7543·0	148	464·96	17203
49	153.94	1885·74	99	311·02	7697·7	149	468·10	17437
50	157·08	1963·5	100	314·16	7854·0	150	471·24	17671

Circumference and Area of Circles.

Diameter.	Circum. ○	Area. ●	Diameter.	Circum. ○	Area. ●	Diameter.	Circum. ○	Area. ●
151	474·38	17908	201	631·46	31731	251	788·54	49431
152	477·52	18146	202	634·60	32047	252	791·68	49876
153	480·66	18385	203	637·74	32365	253	794·82	50273
154	483·81	18627	204	640·89	32685	254	797·96	50671
155	486·95	18869	205	644·03	33006	255	801·11	51071
156	490·09	19113	206	647·17	33329	256	804·25	51472
157	493·23	19359	207	650·31	33654	257	807·39	51875
158	496·37	19607	208	653·45	33979	258	810·53	52279
159	499·51	19856	209	656·59	34307	259	813·67	52685
160	502·65	20106	210	659·73	34636	260	816·81	53093
161	505·80	20358	211	662·88	34967	261	819·96	53502
162	508·94	20612	212	666·02	35299	262	823·10	53913
163	512·08	20867	213	669·16	35633	263	826·24	54325
164	515·22	21124	214	672·30	35968	264	829·38	54739
165	518·36	21382	215	675·44	36305	265	832·52	55155
166	521·50	21642	216	678·58	36644	266	835·66	55572
167	524·65	21904	217	681·73	36984	267	838·81	55990
168	527·79	22167	218	684·87	37325	268	841·95	56410
169	530·93	22432	219	688·01	37668	269	845·09	56832
170	534·07	22698	220	691·15	38013	270	848·23	57256
171	537·21	22966	221	694·29	38360	271	851·37	57680
172	540·35	23235	222	697·43	38708	272	854·51	58107
173	543·50	23506	223	700·58	39057	273	857·66	58535
174	546·64	23779	224	703·72	39408	274	860·80	58965
175	549·78	24053	225	706·86	39761	275	863·94	59396
176	552·92	24328	226	710·00	40115	276	867·08	59828
177	556·06	24606	227	713·14	40471	277	870·22	60263
178	559·20	24885	228	716·28	40828	278	873·36	60699
179	562·35	25165	229	719·42	41187	279	876·50	61136
180	565·49	25447	230	722·57	41548	280	879·65	61575
181	568·63	25730	231	725·71	41910	281	882·79	62016
182	571·77	26016	232	728·85	42273	282	885·93	62458
183	574·91	26302	233	731·99	42638	283	889·07	62902
184	578·05	26590	234	735·13	43005	284	892·21	63347
185	581·19	26880	235	738·27	43374	285	895·35	63794
186	584·34	27172	236	741·42	43744	286	898·50	64242
187	587·48	27465	237	744·56	44115	287	901·64	64692
188	590·62	27759	238	747·70	44488	288	904·78	65144
189	593·76	28055	239	750·84	44863	289	907·92	65597
190	596·90	28353	240	753·98	45239	290	911·06	66052
191	600·04	28652	241	757·12	45617	291	914·20	66508
192	603·19	28953	242	760·27	45996	292	917·35	66966
193	606·33	29256	243	763·41	46377	293	920·49	67426
194	609·47	29559	244	766·55	46759	294	923·63	67887
195	612·61	29865	245	769·69	47144	295	926·77	68349
196	615·75	30172	246	772·83	47529	296	929·91	68813
197	618·89	30481	247	775·97	47916	297	933·05	69279
198	622·04	30791	248	779·12	48305	298	936·19	69747
199	625·18	31103	249	782·26	48696	299	939·34	70215
200	628·32	31416	250	785·40	49087	300	942·48	70686

CIRCUMFERENCE AND AREA OF CIRCLES.

Diameter.	Circum.	Area.	Diameter.	Circum.	Area.	Diameter.	Circum.	Area.
301	945·62	71158	351	1102·70	96762	401	1259·78	126293
302	948·76	71631	352	1105·84	97314	402	1262·92	126923
303	951·90	72107	353	1108·98	97868	403	1266·06	127556
304	955·04	72583	354	1112·12	98423	404	1269·20	128190
305	958·19	73062	355	1115·27	98980	405	1272·35	128825
306	961·33	73542	356	1118·41	99538	406	1275·49	129462
307	964·47	74023	357	1121·55	100098	407	1278·63	130100
308	967·61	74506	358	1124·69	100660	408	1281·77	130741
309	970·75	74991	359	1127·83	101223	409	1284·91	131382
310	973·89	75477	360	1130·97	101788	410	1288·05	132025
311	977·04	75964	361	1134·11	102354	411	1291·19	132670
312	980·18	76454	362	1137·26	102922	412	1294·34	133317
313	983·32	76945	363	1140·40	103491	413	1297·48	133965
314	986·46	77437	364	1143·54	104062	414	1300·62	134614
315	989·60	77931	365	1146·68	104635	415	1303·76	135265
316	992·74	78427	366	1149·82	105209	416	1306·90	135918
317	995·88	78924	367	1152·96	105785	417	1310·04	136572
318	999·03	79423	368	1156·11	106362	418	1313·19	137228
319	1002·17	79923	369	1159·25	106941	419	1316·33	137885
320	1005·31	80425	370	1162·39	107521	420	1319·47	138544
321	1008·45	80928	371	1165·53	108103	421	1322·61	139205
322	1011·59	81433	372	1168·67	108687	422	1325·75	139867
323	1014·73	81940	373	1171·81	109272	423	1328·89	140531
324	1017·88	82448	374	1174·96	109858	424	1332·04	141196
325	1021·02	82958	375	1178·10	110447	425	1335·18	141863
326	1024·16	83469	376	1181·24	111036	426	1338·32	142531
327	1027·30	83982	377	1184·38	111628	427	1341·46	143201
328	1030·44	84496	378	1187·52	112221	428	1344·60	143872
329	1033·58	85012	379	1190·66	112815	429	1347·74	144545
330	1036·73	85530	380	1193·81	113411	430	1350·88	145220
331	1039·87	86049	381	1196·95	114009	431	1354·03	145896
332	1043·01	86570	382	1200·09	114608	432	1357·17	146574
333	1046·15	87092	383	1203·23	115209	433	1360·31	147254
334	1049·29	87616	384	1206·37	115812	434	1363·45	147934
335	1052·43	88141	385	1209·51	116416	435	1366·59	148617
336	1055·58	88668	386	1212·65	117021	436	1369·73	149301
337	1058·72	89197	387	1215·80	117628	437	1372·88	149987
338	1061·86	89727	388	1218·94	118237	438	1376·02	150674
339	1065·00	90259	389	1222·08	118847	439	1379·16	151363
340	1068·14	90792	390	1225·22	119459	440	1382·30	152053
341	1071·28	91327	391	1228·36	120072	441	1385·44	152745
342	1074·42	91863	392	1231·50	120687	442	1388·58	153439
343	1077·57	92401	393	1234·65	121304	443	1391·73	154134
344	1080·71	92941	394	1237·79	121922	444	1394·87	154830
345	1083·85	93482	395	1240·93	122542	445	1398·01	155528
346	1086·99	94025	396	1244·07	123163	446	1401·15	156228
347	1090·13	94569	397	1247·21	123786	447	1404·29	156930
348	1093·27	95115	398	1250·35	124410	448	1407·43	157633
349	1096·42	95662	399	1253·50	125036	449	1410·58	158337
350	1099·56	96211	400	1256·64	125664	450	1413·72	159043

Circumference and Area of Circles.

Diameter.	Circum.	Area.	Diameter.	Circum.	Area.	Diameter.	Circum.	Area.
451	1416·86	159751	501	1573·94	197136	551	1731·02	238448
452	1420·00	160460	502	1577·08	197923	552	1734·16	239314
453	1423·14	161171	503	1580·22	198713	553	1737·30	240182
454	1426·28	161883	504	1583·36	199504	554	1740·44	241051
455	1429·42	162597	505	1586·50	200296	555	1743·58	241922
456	1432·57	163313	506	1589·65	201090	556	1746·73	242795
457	1435·71	164030	507	1592·79	201886	557	1749·87	243669
458	1438·85	164748	508	1595·93	202683	558	1753·01	244545
459	1441·99	165468	509	1599·07	203482	559	1756·15	245422
460	1445·13	166190	510	1602·21	204282	560	1759·29	246301
461	1448·27	166914	511	1605·35	205084	561	1762·43	247181
462	1451·42	167639	512	1608·50	205887	562	1765·58	248063
463	1454·56	168365	513	1611·64	206692	563	1768·72	248947
464	1457·70	169093	514	1614·78	207499	564	1771·86	249832
465	1460·84	169823	515	1617·92	208307	565	1775·00	250719
466	1463·98	170554	516	1621·06	209117	566	1778·14	251607
467	1467·12	171287	517	1624·20	209928	567	1781·28	252497
468	1470·27	172021	518	1627·35	210741	568	1784·42	253388
469	1473·41	172757	519	1630·49	211556	569	1787·57	254281
470	1476·55	173494	520	1633·63	212372	570	1790·71	255176
471	1479·69	174234	521	1636·77	213189	571	1793·85	256072
472	1482·83	174974	522	1639·91	214008	572	1796·99	256970
473	1485·97	175716	523	1643·05	214829	573	1800·13	257869
474	1489·11	176460	524	1646·20	215651	574	1803·27	258770
475	1492·26	177205	525	1649·34	216475	575	1806·42	259672
476	1495·40	177952	526	1652·48	217301	576	1809·56	260576
477	1498·54	178701	527	1655·62	218128	577	1812·70	261482
478	1501·68	179451	528	1658·76	218956	578	1815·84	262389
479	1504·82	180203	529	1661·90	219787	579	1818·98	263298
480	1507·96	180956	530	1665·04	220618	580	1822·12	264208
481	1511·11	181711	531	1668·19	221452	581	1825·27	265120
482	1514·25	182467	532	1671·33	222287	582	1828·41	266033
483	1517·39	183225	533	1674·47	223123	583	1831·55	266948
484	1520·53	183984	534	1677·61	223961	584	1834·69	267865
485	1523·67	184745	535	1680·75	224801	585	1837·83	268783
486	1526·81	185508	536	1683·89	225642	586	1840·97	269702
487	1529·96	186272	537	1687·04	226484	587	1844·11	270624
488	1533·10	187038	538	1690·18	227329	588	1847·26	271547
489	1536·24	187805	539	1693·32	228175	589	1850·40	272471
490	1539·38	188574	540	1696·46	229022	590	1853·54	273397
491	1542·52	189345	541	1699·60	229871	591	1856·68	274325
492	1545·66	190117	542	1702·74	230722	592	1859·82	275254
493	1548·81	190890	543	1705·88	231574	593	1862·96	276184
494	1551·95	191665	544	1709·03	232428	594	1866·11	277117
495	1555·09	192442	545	1712·17	233283	595	1869·25	278051
496	1558·23	193221	546	1715·31	234140	596	1872·39	278986
497	1561·37	194000	547	1718·45	234998	597	1875·53	279923
498	1564·51	194782	548	1721·59	235858	598	1878·67	280862
499	1567·65	195565	549	1724·73	236720	599	1881·81	281802
500	1570·80	196350	550	1727·88	237583	600	1884·96	282743

CIRCUMFERENCE AND AREA OF CIRCLES.

Diameter.	Circum.	Area.	Diameter.	Circum.	Area.	Diameter.	Circum.	Area.
601	1888·10	283687	651	2045·18	332853	701	2202·26	385945
602	1891·24	284631	652	2048·32	333876	702	2205·40	387047
603	1894·38	285578	653	2051·46	334901	703	2208·54	388151
604	1897·52	286526	654	2054·60	335927	704	2211·68	389256
605	1900·66	287475	655	2057·74	336955	705	2214·82	390363
606	1903·81	288426	656	2060·88	337985	706	2217·96	391471
607	1906·95	289379	657	2064·03	339016	707	2221·11	392580
608	1910·09	290333	658	2067·17	340049	708	2224·25	393692
609	1913·23	291289	659	2070·31	341083	709	2227·39	394805
610	1916·37	292247	660	2073·45	342119	710	2230·53	395919
611	1919·51	293206	661	2076·59	343157	711	2233·67	397035
612	1922·65	294166	662	2079·73	344196	712	2236·81	398153
613	1925·80	295128	663	2082·88	345237	713	2239·96	399272
614	1928·94	296092	664	2086·02	346279	714	2243·10	400393
615	1932·08	297057	665	2089·16	347323	715	2246·24	401515
616	1935·22	298024	666	2092·30	348368	716	2249·38	402639
617	1938·36	298992	667	2095·44	349415	717	2252·52	403765
618	1941·50	299962	668	2098·58	350464	718	2255·66	404892
619	1944·65	300934	669	2101·73	351514	719	2258·81	406020
620	1947·79	301907	670	2104·87	352565	720	2261·95	407150
621	1950·93	302882	671	2105·01	353618	721	2265·09	408282
622	1954·07	303858	672	2111·15	354673	722	2268·23	409416
623	1957·21	304836	673	2114·29	355730	723	2271·37	410550
624	1960·35	305815	674	2117·43	356788	724	2274·51	411687
625	1963·50	306796	675	2120·58	357847	725	2277·65	412825
626	1966·64	307779	676	2123·72	358908	726	2280·80	413965
627	1969·78	308763	677	2126·86	359971	727	2283·94	415106
628	1972·92	309748	678	2130·00	361035	728	2287·08	416248
629	1976·06	310736	679	2133·14	362101	729	2290·22	417393
630	1979·20	311725	680	2136·28	363168	730	2293·36	418539
631	1982·35	312715	681	2139·42	364237	731	2296·50	419686
632	1985·49	313707	682	2142·57	365308	732	2299·65	420835
633	1988·63	314700	683	2145·71	366380	733	2302·79	421986
634	1991·77	315696	684	2148·85	367453	734	2305·93	423139
635	1994·91	316692	685	2151·99	368528	735	2309·07	424292
636	1998·05	317690	686	2155·13	369605	736	2312·21	425447
637	2001·19	318690	687	2158·27	370684	737	2315·35	426604
638	2004·34	319692	688	2161·42	371764	738	2318·50	427762
639	2007·48	320695	689	2164·56	372845	739	2321·64	428922
640	2010·62	321699	690	2167·70	373928	740	2324·78	430084
641	2013·67	322705	691	2170·84	375013	741	2327·92	431247
642	2016·90	323713	692	2173·98	376099	742	2331·06	432412
643	2020·04	324722	693	2177·12	377187	743	2334·20	433578
644	2023·19	325733	694	2180·27	378276	744	2337·34	434746
645	2026·33	326745	695	2183·41	379367	745	2340·49	435916
646	2029·47	327759	696	2186·55	380459	746	2343·63	437087
647	2032·61	328775	697	2189·69	381554	747	2346·77	438259
648	2035·75	329792	698	2192·83	382649	748	2349·91	439433
649	2038·89	330810	699	2195·97	383746	749	2353·05	440609
650	2042·04	331831	700	2199·11	384845	750	2356·19	441786

Circumference and Area of Circles.

Diameter.	Circum.	Area.	Diameter.	Circum.	Area.	Diameter.	Circum.	Area.
751	2359·34	442965	801	2516·42	503912	851	2673·50	568786
752	2362·48	444146	802	2519·56	505171	852	2676·64	570124
753	2365·62	445328	803	2522·70	506432	853	2679·78	571463
754	2368·76	446511	804	2525·84	507694	854	2682·92	572803
755	2371·90	447697	805	2528·98	508958	855	2686·06	574146
756	2375·04	448883	806	2532·12	510223	856	2689·20	575490
757	2378·19	450072	807	2535·27	511490	857	2692·34	576835
758	2381·33	451262	808	2538·41	512758	858	2695·49	578182
759	2384·47	452453	809	2541·55	514028	859	2698·63	579530
760	2387·61	453646	810	2544·69	515300	860	2701·77	580880
761	2390·75	454841	811	2547·83	516573	861	2704·91	582232
762	2393·89	456037	812	2550·97	517848	862	2708·05	583585
763	2397·04	457234	813	2554·11	519124	863	2711·19	584940
764	2400·18	458434	814	2557·26	520402	864	2714·34	586297
765	2403·32	459635	815	2560·40	521681	865	2717·48	587655
766	2406·46	460837	816	2563·54	522962	866	2720·62	589014
767	2409·60	462041	817	2566·68	524245	867	2723·76	590375
768	2412·74	463247	818	2569·82	525529	868	2726·90	591738
769	2415·88	464454	819	2572·96	526814	869	2730·04	593102
770	2419·03	465663	820	2576·11	528102	870	2733·19	594468
771	2422·17	466873	821	2579·25	529391	871	2736·33	595835
772	2425·31	468085	822	2582·39	530681	872	2739·47	597204
773	2428·45	469298	823	2585·53	531973	873	2742·61	598575
774	2431·59	470513	824	2588·67	533267	874	2745·75	599947
775	2434·73	471730	825	2591·81	534562	875	2748·89	601320
776	2437·88	472948	826	2594·96	535858	876	2752·04	602696
777	2441·02	474168	827	2598·10	537157	877	2755·18	604073
778	2444·16	475389	828	2601·24	538456	878	2758·32	605451
779	2447·30	476612	829	2604·38	539758	879	2761·46	606831
780	2450·44	477836	830	2607·52	541061	880	2764·60	608212
781	2453·58	479062	831	2610·66	542365	881	2767·74	609595
782	2456·73	480290	832	2613·81	543671	882	2770·88	610980
783	2459·87	481519	833	2616·95	544979	883	2774·03	612366
784	2463·01	482750	834	2620·09	546288	884	2777·17	613754
785	2466·15	483982	835	2623·23	547599	885	2780·31	615143
786	2469·29	485216	836	2626·37	548912	886	2783·45	616534
787	2472·43	486451	837	2629·51	550226	887	2786·59	617927
788	2475·58	487688	838	2632·65	551541	888	2789·73	619321
789	2478·72	488927	839	2635·80	552858	889	2792·88	620717
790	2481·86	490167	840	2638·94	554177	890	2796·02	622114
791	2485·00	491409	841	2642·08	555497	891	2799·16	623513
792	2488·14	492652	842	2645·22	556819	892	2802·30	624913
793	2491·28	493897	843	2648·36	558142	893	2805·44	626315
794	2494·42	495143	844	2651·50	559467	894	2808·58	627718
795	2497·57	496391	845	2654·65	560794	895	2811·73	629124
796	2500·71	497641	846	2657·79	562122	896	2814·87	630530
797	2503·85	498892	847	2660·93	563452	897	2818·01	631938
798	2506·99	500145	848	2664·07	564783	898	2821·15	633348
799	2510·13	501399	849	2667·21	566116	899	2824·29	634760
800	2513·27	502655	850	2670·35	567450	900	2827·43	636173

Circumference and Area of Circles.

Diameter.	Circum.	Area.	Diameter.	Circum.	Area.	Diameter.	Circum.	Area.
901	2830·58	637587	934	2934·25	685147	967	3037·92	734417
902	2833·72	639003	935	2937·39	686615	968	3041·06	735937
903	2836·86	640421	936	2940·53	688084	969	3044·20	737458
904	2840·00	641840	937	2943·67	689555	970	3047·34	738981
905	2843·14	643261	938	2946·81	691028	971	3050·49	740506
906	2846·28	644683	939	2949·96	692502	972	3053·63	742032
907	2849·42	646107	940	2953·10	693978	973	3056·77	743559
908	2852·57	647533	941	2956·24	695455	974	3059·91	745088
909	2855·71	648960	942	2959·38	696934	975	3063·05	746619
910	2858·85	650388	943	2962·52	698415	976	3066·19	748151
911	2861·99	651818	944	2965·66	699897	977	3069·34	749685
912	2865·13	653250	945	2968·81	701380	978	3072·48	751221
913	2868·27	654684	946	2971·95	702865	979	3075·62	752758
914	2871·42	656118	947	2975·09	704352	980	3078·76	754296
915	2874·56	657555	948	2978·23	705840	981	3081·90	755837
916	2877·70	658993	949	2981·37	707330	982	3085·04	757378
917	2880·84	660433	950	2984·51	708822	983	3088·19	758922
918	2883·98	661874	951	2987·65	710315	984	3091·33	760466
919	2887·12	663317	952	2990·80	711809	985	3094·47	762013
920	2890·27	664761	953	2993·94	713307	986	3097·61	763561
921	2893·41	666207	954	2997·08	714803	987	3100·75	765111
922	2896·55	667654	955	3000·22	716303	988	3103·89	766662
923	2899·69	669103	956	3003·36	717804	989	3107·04	768215
924	2902·83	670554	957	3006·50	719306	990	3110·18	769769
925	2905·97	672006	958	3009·65	720810	991	3113·32	771325
926	2909·11	673460	959	3012·79	722316	992	3116·46	772882
927	2912·26	674915	960	3015·93	723823	993	3119·60	774441
928	2915·40	676372	961	3019·07	725332	994	3122·74	776002
929	2918·54	677831	962	3022·21	726842	995	3125·88	777564
930	2921·68	679291	963	3025·35	728354	996	3129·03	779128
931	2924·82	680752	964	3028·50	729867	997	3132·17	780693
932	2927·96	682216	965	3031·64	731382	998	3135·31	782260
933	2931·11	683680	966	3034·78	732899	999	3138·45	783828

Explanation of the Preceding Table.

When the diameter is expressed in more or less units than in the table, add or subtract so many figures more in the circumference: add or subtract twice as many in the area.

Examples.

Diameter.	Circumference.	Area.
9370	29436.7	68955500
93.7	294.367	6895.55
9.37	29.4367	68.9555
0.937	2.94367	0.689555

TENACITY OF MATERIALS. (Rankine and others.)

Material.	Dimensions.	Tearing load in lbs.	Length of a lb. weight in feet.	Tenacity in feet of the material.
Cast-steel bar ..	1 in. × 1 in.	130,000	0·297	38,610
Charcoal iron wire	Area, 1 sq. in.	100,000	0·3	30,000
Iron wire rope ..	Girth, 1·27 in.	4,480	0·6	26,880
Iron bar, strong	1 in. × 1 in.	60,000	0·3	18,000
Boiler-plate, strong	Area, 1 sq. in.	50,000	0·3	15,000
Teak wood	1 in. × 1 in.	15,000	3·0	45,000
Deal	1 in. × 1 in.	12,000	4·0	48,000
Hempen rope, hawser laid ..	Girth, 1 in.	1,050	26·0	27,300
Ditto, cable laid	Girth, 10 ins.	67,200	0·279	18,750

TILER.

	Size.	Weight of each.	Weight per 1000.
	in. in. in.	lbs.	cwts.
Plain tiles..	$10\frac{1}{2} \times 6\frac{1}{2} \times \frac{5}{8}$	$2\frac{1}{4}$	$22\frac{1}{2}$
„	$11 \times 7 \times \frac{5}{8}$	$2\frac{9}{10}$	$26\frac{1}{2}$
Pantile	$13\frac{1}{2} \times 9\frac{1}{2} \times \frac{1}{2}$	$5\frac{1}{4}$	47

	Length.	Girth.	Weight per 100.
	inches.	inches.	cwts.
Ridge tile, plain.. ..	18	14	14
„ rolled top..	18	14	18
„ capped ..	18	14	15
„ pyramid ..	18	14	20

Roofing requires 800 plain tiles per square, laid to 3 inch gauge.
„ 700 „ „ „ $3\frac{1}{4}$ „
„ 600 „ „ „ 4 „
„ 180 pantiles „ „ 10 „
„ 164 „ „ „ 11 „
„ 150 „ „ „ 12 „

1 square of plain tiling weighs about 15 cwt.
1 „ pantiling „ 8 „

Plain tiling is laid on fir fillets $1\frac{1}{2}$ in. × 1 in., or on oak laths $1\frac{1}{2}$ in. × $\frac{1}{2}$ in.
100 plain tile laths, 5 ft. long .. .. .. = 1 bundle.
12 pantile laths, $1\frac{1}{2}$ in. × 1 in. × 10 ft. long = 1 „

1 square of plain tiling requires { 1 bundle of laths. / $1\frac{1}{2}$ hundred of nails. / 1 peck of tile-pins. / 3 bods of mortar.

„ pantiling „ { 1 bundle of laths. / $1\frac{1}{2}$ hundred of 6d. nails.

TIMBER. (Britton, &c.)

Density of timber is in proportion to the time in growing.

The lower part of the tree gives the strongest timber.

The heaviest woods are generally the strongest.

The heart is weaker than the exterior parts, and the bark is weaker than the rest.

The greatest strength is generally to be found between the centre and the sap, and timber that is straight in the grain is strongest.

European deals, from 10 to 22 ft. in length and from 8 in. to 10 in. in breadth.

American deals, from 10 to 13 ft. in length and from 9 to 11 in. in breadth.

Slab deals are cut from the outsides of timbers.

Spruce deals are thin deals cut from the white fir trees of Norway.

Yellow deals are generally of a bright yellow colour, and have not lost their resin. In selecting them the brightest should be chosen, and where the strong red grain apparently rises to the surface. Yellow deals are the strongest; they are likewise the dearest.

White fir, known in the English market as "white deal," is seldom imported into this country in logs, but mostly as deals and battens, 2 to 3 in. thick and 5 to 9 in. wide, and are usually cut into lengths of about 12 ft. It unites well with glue, takes stain well, and is capable of taking a high polish. For floors and panels Christiania white deal is considered best.

Timber cut into sizes of various lengths:—

Scantlings 11 in. to 12 in. wide × 3 in. thick are called planks.

Scantlings 9 in. wide × 3 in. thick are called deals.

Scantlings 2 in. to 7 in. wide × 2 in. thick are called battens.

Scantlings 4½ in. wide × 3 in. thick are called battens.

Woods do not alter materially in their length, but in width they contract, warp, and twist.

Timber is permanently injured if more than ¼th the breaking weight is placed upon it.

BEST TIMBERS FOR VARIOUS USES.

General Construction.

Oak.	Fir.	Pine.
Chestnut.	Elm.	Beech.
Teak.	Walnut.	Mahogany.
Cedar.	Larch.	Poplar.

Acacia, spruce fir (scaffolding, ladders, &c.).

Timbers Durable in Wet.

Oak.	Elm.	Beech.
Alder.	White cedar.	Plane.
Teak.	Larch.	Plane (North American).
Acacia.	Iron bark.	

Timbers Durable in Dry Places.

Oak.	Deal.	Poplar.
Chestnut.	Cedar.	Teak.
Olive.	Pines.	Walnut.
Mahogany.	Maple.	Sycamore.
Larch.	Ash.	Acacia.
Willow.	Plane.	

For Patterns.

Deal.	Alder.	Pine.	Mahogany.

Hardest English Woods.

Box.	Elm.	Beech.
Oak.	Walnut.	

WEIGHTS OF TIMBERS. (Rondelet, Tredgold, and others.)

Description.	Weight per cubic foot in lbs.
Ash	52
Beech	53
Birch	42
Box	57
Cedar of Lebanon	35
Chestnut	37
Cork	15
Ebony	63
Elm	42
Fir	31
„ Memel	37
Larch	33
Mahogany, Spanish	66
Oak, English	53
„ American	45
Pine, yellow	26
„ red	40
„ pitch	45
Poplar	24
Sycamore	38
Teak	47
Walnut	41
Yew	47

TABLE SHOWING NUMBER OF RUNNING FEET CONTAINED IN A PETERSBURG STANDARD.

Size.	Running Feet per Standard.	Size.	Running Feet per Standard.
2 × 4	2970	3 × 4	1980
2 × 4½	2640	3 × 4½	1760
2 × 5	2376	3 × 5	1584
2 × 5½	2160	3 × 5½	1440
2 × 6	1980	3 × 6	1320
2 × 6½	1827 6/11	3 × 6½	1218 6/11
2 × 7	1697 1/7	3 × 7	1131 3/7
2 × 8	1485	3 × 8	990
2 × 9	1320	3 × 9	880
2 × 10	1188	3 × 10	792
2 × 11	1080	3 × 11	720
2 × 12	990	3 × 12	660
2½ × 4	2376	4 × 4	1485
2½ × 4½	2112	4 × 4½	1320
2½ × 5	1900 4/5	4 × 5	1188
2½ × 5½	1728	4 × 5½	1080
2½ × 6	1584	4 × 6	990
2½ × 6½	1462 2/13	4 × 6½	913 1/2
2½ × 7	1357 1/7	4 × 7	848 3/7
2½ × 8	1188	4 × 8	742 1/2
2½ × 9	1056	4 × 9	660
2½ × 10	950 2/5	4 × 10	594
2½ × 11	864	4 × 11	540
2½ × 12	792	4 × 12	495

A Petersburg Standard contains 165 cubic feet and weighs about 2½ tons.

TIMBER MEASURING.

G = ¼th girt of tree at middle in feet.
g = ¼th girt of tree at one end in feet.
g' = ¼th girt of tree at the other end in feet.
L = Length of log in feet.
c = Cube contents of log in feet.

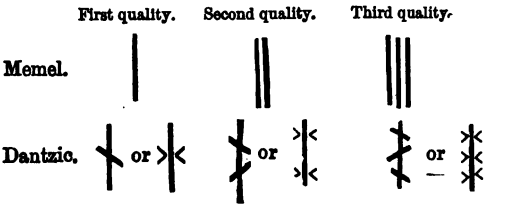
$$c = \mathrm{L}\left(\frac{\mathrm{G} + g + g'}{3}\right)^2.$$

Allowance is to be made for bark by deducting from each ¼th girt. The allowance varies from half an inch in trees with thin bark to 2 inches for trees with thick bark.

MEASURES OF TIMBER.

100 superficial feet of planking .. .. = 1 square.
120 deals .. .. = 1 hundred.
50 cubic feet of squared timber .. .. = 1 load.
40 feet of unhewn timber .. .. .. = 1 load.
600 superficial ft. of inch planking .. = 1 load.
Boards 7 inches wide .. .. = battens.
„ 9 „ .. .. = deals.
„ 12 „ .. .. = planks.

Distinguishing Scribe Marks on Timber.



Dantzic.

Crown.	1st Quality.	2nd Quality.	3rd Quality.
S K K	S K	S K I	S K II
M K K	M K	M K I	M K II
O H P K	O H P	O H P I	O H P II
S M	S M	S M	S M
22×26 K	22×26 I	22×26 II	22×26 III

Russian.

S K K R S K R S K I R S K II R

Brand Marks on Deals.

Russian Ports.

Uleaborg, S. Petersburg, and Bjorneborg.

Crown.	1st Quality.	2nd Quality.	3rd Quality.
A	C M B	B S S C	B C
red	N B fi	B	
B	P B 2	U S	
F J F			
J I G			
N B I			
P B			

Prussian Port.

Dantzic.

Crown Deck.	Crown Brack Deck.
C C B	C C B
♚	E H
E H E H E H	F G F
♚ ♚	J C B J C B J C B
J C B	♚ R J
S K S K S K	S K S K

Swedish Ports.

Gothenburg.

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
		A L O	A × O	L × O
		C F W	C × G	× M ×
		D B & C°	× C ×	S S
		H * C°	D D D	
		H S H	E W	
		M	G	
		J C & C°	G A W	
		O * L	J W	
		S R & C°	L * L	

Skepsta.

	U B	S * F
	B & C°	U × S
	♚	W M
	W A L L	W * S

Gefle.

P M	R × C	B B	B L	C × × B
R W ♚ S	R W × S	C ♚ B	C × B	D M
		C V B	C × × B	E * B
		D M	D × A	B × × B
		E I B	D O M	+ M +
		E K B	E I I B	P
		G R A	E × B	S A G
		J ♚ P	H A	W
		K A B	H A B	* * *
		K H	J P	
		K H B	N A S	
		S K B	W × S	

Soderham.

♚	M × T	C × D	B C
SB	S T H	E S B	C
J F S	V	G C & C°	G G
		M A R M A	G G G
M ♚ T		O O O	M B
V		O W & C°	M M M
			O W.
			O × W
			S S T

Hudiksvall, Norkoping, Sundswall, Stockholm, Lojune, and Mo.

1st	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
S ♚ B T U N A	S × B	C E F I I K F & C° 1	D D D F & C° 2 J E F	J E F O O X
		G E ♚ F J G G G & C° M X O B & C° W ♚ R W I R A } M I X E D } W W	K × T N W N X R A R R R R W W W I R A } T E R T I A }	

Norway.

Christiania.

A × T H H H P W H × W L M M S N × S P M A S I B T I H & S V E D W F I	A × H A H S B H F C × S F H B F V B H & S H y S H M S H S W L B P × W R R B	I M H R H W M E	A C A W A W W B D L D H × H H T W M H M R B S × S T R B	

Drammen.

E × E E ix E E viii E viii E I B J I R M }	A 3 S A N 2 B C & C° viii E H K & C° I I I I × E I E I I R P I 2 S J 2 R K 2 S K W M × N N ii N J N M S — C	A N T A B B	A A A × B A 3 B A H C C E E E E × E H H C H × H H K I E I I I I R I W J I I J 3 R K 3 S L L	K

Drammen—*continued.*

1st.	2nd.	1st and 2nd Mixed.	3rd.	4th Quality.
	T * M		L — L	
	T × T		N A M	
	X X		N B	
			N iii B	
			N xxx	
			P	
			R iii	
			S C	
			S × C	
			T B	
			T M	
			T T	
			W D	
			*	

Fredericstadt.

A K° C°	A K C°	A T & C°	C × S	H B
H * B	B × B	F S M	F S C	
J B	K × K		G	
J N J	M M		H B T	
S F A	S F B		S W S	
W B	W W			
W G				
W I E L & C°				
W I E S				

Marks on Planks, Deals, and Battens.

With few exceptions the following general rules apply:

Goods from Swedish ports are stencilled with *red* letters or marks on the ends.

Goods from Russian and Finland ports are what is termed "hammer branded" or "dry stamped" on the ends, *i.e.* they are indented with small uncoloured letters about one inch long. The numbers which occur in some in Arabic figures do not denote quality, but the number of yard of the exporter.

Norway goods are mostly stencilled with blue letters; Canada goods with black letters, and white letters on ends, and red quality or sorting marks on edges near ends.

Any quantity of deals, planks, or battens equivalent in cubical contents to No. 120 11 in. × 1½ in. is a Standard 100 or Petersburg Standard, but they are often dealt in by what is known as London Standard 100, equivalent to No. 120, 9 in. × 3 in.

Builders' "yellow" deals are in timber merchants' phrase red deals.

In baulk timber the merchants' "first" quality or "crown" is picked for straightness of grain and freedom from knots only; it is frequently very sappy: a considerable portion of it cuts up badly, and it is subject to heart shakes, whilst its very straightness and softness render it not so well adapted to carry heavy weights as the second quality or best middling.

TABLE OF THE TRANSVERSE STRENGTH OF TIMBER, 1 INCH SQUARE, 1 FOOT LONG.

Name.	Specific Gravity.	Barlow.	Tredgold.
		Value of S.*	Value of S.*
		lbs.	lbs.
Ash, English	·760	675	656
Beech "	·696	519	677
Birch, common	·711	607	—
Elm, English	·579	338	540
" American	—	611	—
Oak, English	·829	400	710
" "	—	470	400
" Adriatic	—	461	448
" Canadian	—	588	—
" Dantzic	·720	486	—
" Riga	—	—	714
Pine, American, red	·576	447	—
" " yellow	·508	—	658
" pitch	·740	544	560
" Memel	·601	577	545
" Riga	·654	376	530
Fir, spruce, American	·772	—	570
" Mar Forest	·698	408	315
" Scotch	—	—	582
" New England	—	367	—
Deal, Christiania	·689	521	686
Larch	·505	280	557
Walnut	—	—	500
Spanish Chestnut	—	—	610
Mahogany, Honduras	—	—	637
" Spanish	—	—	425
Teak	·729	820	717
Pcon	—	740	590

* Value of S is the value in lbs. of S used in the formulæ for calculating the strength of girders.

TRIANGLES AND ANGLES.

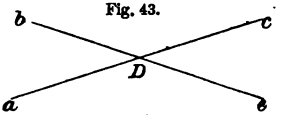
A right angle = 90°.

An obtuse angle is an angle of more than 90°.

An acute angle is less than 90°.

If two straight lines cut one another, the vertical or opposite angles are equal. (Euclid, Bk. I., prop. 15.)

Fig. 43.



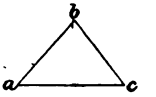
Thus the angle *a* D *b* is equal to the angle *c* D *e*, and the angle *a* D *e* to the angle *b* D *c*.

And as the angles which one straight line makes with another upon one side of it are together equal to two right angles (Euclid, Bk. I., prop. 13), if any of the angles in the above figure be known, the others are known.

Example.—If angle *a* D *b* is 25°, then the angle *b* D *c* is 180° − 25° = 155°.

The three interior angles of every triangle are together equal to two right angles (Euclid, Bk. I., prop. 32), so that if two angles of a triangle are known, the remaining angle is the difference between the sum of the two and 180°.

Fig. 44.

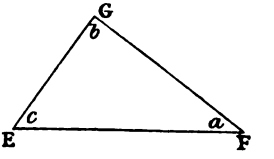


Example.—If in the triangle *a b c* the angle *c a b* is 30° and the angle *a b c* 35°, then the angle *b c a* is 180 − (30 + 35) = 65 = 115°.

The greater side of every triangle is opposite to the greater angle (Euclid, Bk. I., prop. 18); and conversely the greater angle of every triangle is opposite to the greater side.

Given the line E F and the angles *c* and *a* to find the side E G.

Fig. 45.



Find the angle $b = 180° - (c + a)$, then

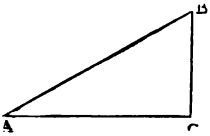
$$E\,G = E\,F \frac{\text{sin. } a}{\text{sin. } b};$$

if the angle be more than 90°,

$$E\,G = E\,F \frac{\text{sin. } (180° - a)}{\text{sin. } b}.$$

Right-angled Triangles.

Fig. 46.



Let
A B = Hypothenuse.
A C = Base.
B C = Perpendicular.
And A, B, and C the respective angles.

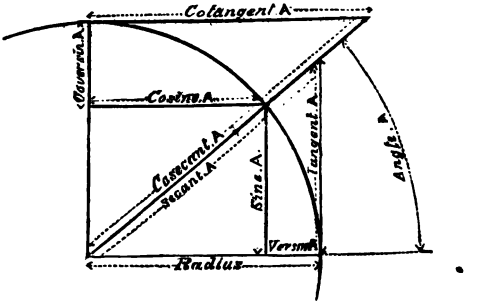
$$\text{Hypoth.} = \sqrt{\text{Base}^2 + \text{Perp.}^2}$$

$$\text{Base} = \sqrt{(\text{Hyp.} + \text{Perp.}) \times (\text{Hyp.} - \text{Perp.})}$$

$$\text{Perp.} = \sqrt{(\text{Hyp.} + \text{Base}) \times (\text{Hyp.} - \text{Base})}$$

TRIGONOMETRICAL EXPRESSIONS.

The diagram shows the different trigonometrical expressions in terms of the angle A.



Complement of an angle = its difference from 90
Supplement „ „ = „ „ 180

VALUATION OF PROPERTY.

Leasehold Property.

1st and 2nd class, from	15	to	16	years' purchase, or		6	per cent.
2nd and 3rd	„	„	14	to	15	„	„	7	„
3rd and 4th	„	„	12	to	13	„	„	8	„
4th and 5th	„	„	11	to	12	„	„	9	„
5th and 6th	„	„	10			„	„	10	„

Freehold land in the country, 30 to 33 years' purchase.

TABLE FOR PURCHASING LEASES OR OTHER ESTATES HELD FOR FIXED TERMS OF YEARS; OR THE PRESENT VALUE OF £1 PER ANNUM FOR ANY NUMBER OF YEARS.

The calculations show the interest a purchaser may make of his money and get back his capital during the term, provided he can reinvest at the same rate of interest.

Years.	Years' Purchase.							
	3 p. c.	4 p. c.	5 p. c.	6 p. c.	7 p. c.	8 p. c.	9 p. c.	10 p. c.
1	0·97	0·96	0·95	0·94	0·94	0·93	0·92	0·91
2	1·91	1·89	1·86	1·83	1·81	1·78	1·76	1·74
3	2·83	2·78	2·72	2·67	2·62	2·58	2·53	2·49
4	3·72	3·63	3·55	3·47	3·39	3·31	3·24	3·17
5	4·58	4·45	4·33	4·21	4·10	3·99	3·89	3·79
6	5·42	5·24	5·08	4·92	4·77	4·62	4·49	4·36
7	6·23	6·00	5·79	5·58	5·39	5·21	5·03	4·87
8	7·02	6·73	6·46	6·21	5·97	5·75	5·54	5·34
9	7·79	7·44	7·11	6·80	6·52	6·25	6·00	5·76
10	8·53	8·11	7·72	7·36	7·02	6·71	6·42	6·15
11	9·25	8·76	8·31	7·89	7·50	7·14	6·81	6·50
12	9·95	9·39	8·86	8·38	7·94	7·54	7·16	6·81
13	10·64	9·99	9·39	8·85	8·36	7·90	7·49	7·10
14	11·30	10·56	9·90	9·30	8·75	8·24	7·79	7·37
15	11·94	11·12	10·38	9·71	9·11	8·56	8·06	7·61
16	12·56	11·65	10·84	10·11	9·45	8·85	8·31	7·82
17	13·17	12·17	11·27	10·48	9·76	9·12	8·54	8·02
18	13·75	12·66	11·69	10·83	10·06	9·37	8·76	8·20
19	14·32	13·13	12·09	11·16	10·34	9·60	8·95	8·37
20	14·88	13·59	12·46	11·47	10·59	9·82	9·13	8·51
21	15·42	14·03	12·82	11·76	10·84	10·02	9·29	8·65
22	15·94	14·45	13·16	12·04	11·06	10·20	9·44	8·77
23	16·44	14·86	13·49	12·30	11·27	10·37	9·58	8·88
24	16·94	15·25	13·80	12·55	11·47	10·53	9·71	8·99
25	17·41	15·62	14·09	12·78	11·65	10·68	9·82	9·08
26	17·88	15·98	14·38	13·00	11·83	10·81	9·93	9·16
27	18·33	16·33	14·64	13·21	11·99	10·94	10·03	9·24
28	18·76	16·66	14·90	13·41	12·14	11·05	10·12	9·31
29	19·19	16·98	15·14	13·59	12·28	11·16	10·20	9·37
30	19·60	17·29	15·37	13·77	12·41	11·26	10·27	9·43
31	20·00	17·59	15·59	13·93	12·53	11·35	10·34	9·48
32	20·39	17·87	15·80	14·08	12·65	11·44	10·41	9·53
33	20·77	18·15	16·00	14·23	12·75	11·51	10·46	9·57
34	21·13	18·41	16·19	14·37	12·85	11·59	10·52	9·61
35	21·49	18·67	16·37	14·50	12·95	11·66	10·57	9·64
36	21·83	18·91	16·55	14·62	13·04	11·72	10·61	9·68
37	22·17	19·14	16·71	14·74	13·12	11·78	10·65	9·71
38	22·49	19·37	16·87	14·85	13·19	11·83	10 69	9·73
39	22·81	19·58	17·02	14·95	13·26	11·88	10·73	9·76
40	23·12	19·79	17·16	15·05	13·33	11·93	10·76	9·78
41	23·41	19·99	17·29	15·14	13·39	11·97	10·79	9·80
42	23·70	20·19	17·42	15·23	13·45	12·01	10·81	9·82
43	23·98	20·37	17·55	15·31	13·51	12·04	10·84	9·83
44	24·25	20·55	17·66	15·38	13·56	12·08	10·86	9·85
45	24·52	20·72	17·77	15·46	13·61	12·11	10·88	9·86
46	24·78	20·89	17·88	15·52	13·65	12·14	10·90	9·88
47	25·03	21·04	17·98	15·59	13·69	12·16	10·92	9·89
48	25·27	21·20	18·08	15·65	13·73	12·19	10·93	9·90
49	25·50	21·34	18·17	15·71	13·77	12·21	10·95	9·91
50	25·73	21·48	18·26	15·76	13·80	12·23	10·96	9·92
55	26·77	22·11	18·63	15·99	13·94	12·32	11·01	9·95

TABLE FOR PURCHASING LEASES—*continued.*

Years.	Years' Purchase.							
	3 p. c.	4 p. c.	5 p. c.	6 p. c.	7 p. c.	8 p. c.	9 p. c.	10 p. c.
60	27·68	22·62	18·93	16·16	14·04	12·38	11·05	9·97
65	28·45	23·05	19·16	16·29	14·10	12·42	11·07	9·98
70	29·12	23·40	19·34	16·39	14·16	12·44	11·08	9·99
75	29·70	23·68	19·49	16·46	14·20	12·46	11·09	9·99
80	30·20	23·92	19·60	16·51	14·22	12·47	11·10	10·00
85	30·63	24·11	19·68	16·55	14·24	12·48	11·11	10·00
90	31·00	24·27	19·75	16·58	14·25	12·49	11·11	10·00
95	31·32	24·40	19·81	16·60	14·26	12·49	11·11	10·00
100	31·60	24·51	19·85	16·62	14·27	12·49	11·11	10·00
Perp.	33·33	25·00	20·00	16·67	14·29	12·50	11·11	10·00

Thus, £50 per ann. for 35 years, at 6 per cent. is worth 14½ years' purchase, or £725.

TABLES FOR ESTIMATING THE VALUE OF THE REVERSION IN FEE IN PURCHASING GROUND RENTS.

After these Years.	Years' Purchase 5 per cent.	Years' Purchase 6 per cent.	Years' Purchase 7 per cent.	Years' Purchase 8 per cent.	Years' Purchase 9 per cent.	Years' Purchase 10 p. cent.
1	19	15⅝	13½	11½	10⅛	9
2	18¼	14⅝	12½	10⅝	9¼	8¼
3	17⅓	14	11⅝	10	8½	7½
4	16½	13½	10⅝	9¼	7¾	6¾
5	15⅝	12½	10¼	8½	7½	6½
6	15	11⅝	9¼	7⅝	6⅝	5⅝
7	14¼	11	9	7½	6	5½
8	13½	10½	8½	6⅝	5½	4⅝
9	13	9⅝	7⅝	6½	5	4½
10	12½	9½	7½	5⅝	4⅝	3⅝
11	11⅝	8⅝	6⅝	5½	4¼	3½
12	11½	8½	6½	5	4	3½
13	10½	7⅝	6	4½	3⅜	3
14	10	7½	5½	4½	3½	2⅝
15	9½	7	5½	4	3	2½
16	9¼	6½	4⅝	3⅝	2⅝	2½
17	8⅝	6½	4½	3½	2½	2
18	8½	5⅝	4½	3⅛	2⅛	1⅝
19	8	5½	4	3	2⅛	1⅝
20	7½	5⅛	3⅝	2⅝	2	1½
21	7⅛	5	3½	2½	1⅝	1⅛
22	6⅝	4⅝	3⅛	2⅛	1⅝	1⅛
23	6½	4½	3	2⅛	1½	1
24	6⅛	4	2⅝	2	1½	1
25	6	3⅝	2⅝	1⅝	1⅛	1
26	5⅝	3⅝	2½	1⅝	1⅛	⅝
27	5½	3½	2⅛	1½	1	⅝
28	5	3⅛	2⅛	1½	1	⅝
29	4⅝	3	2	1⅛	1	⅝
30	4⅝	3	2	1⅛	¾	½
31	4½	2⅝	1⅝	1⅛	¾	½
32	4⅛	2½	1⅝	1	¾	½
33	4	2½	1½	1	⅝	½
34	3⅝	2⅛	1½	1	½	½
35	3⅝	2⅛	1⅛	⅝	½	½

TABLES OF REVERSION IN FEE—*continued.*

After these Years.	Years' Purchase 5 per cent.	Years' Purchase 6 per cent.	Years' Purchase 7 per cent.	Years' Purchase 8 per cent.	Years' Purchase 9 per cent.	Years' Purchase 10 p. cent.
36	3½	2	1½	¾	¼	¼
37	3½	2	1½	¾	¼	¼
38	3½	1¾	1	¾	¼	¼
39	3	1¾	1	¼	¼	¼
40	2¾	1½	1	¼	¼	¼
41	2¾	1½	1	¼	¼	¼
42	2½	1½	¾	¼	¼	¼
43	2½	1½	¾	¼	¼	¼
44	2½	1½	¾	¼	¼	¼
45	2½	1½	¾	¼	¼	¼
46	2	1½	¾	¼	¼	¼
47	2	1	½	¼	¼	¼
48	2	1	½	¼	¼	1/10
49	1¾	1	½	¼	¼	1/10
50	1¾	1	½	¼	¼	1/10
51	1¾	¾	½	¼	¼	1/10
52	1½	¾	½	¼	¼	1/10
53	1½	¾	½	¼	¼	1/10
54	1½	¾	½	¼	¼	1/10
55	1½	¾	½	¼	1/10	1/10
56	1½	¾	½	¼	1/10	1/10
57	1¼	½	½	¼	1/10	1/10
58	1¼	½	½	¼	1/10	1/10
59	1	½	½	¼	1/10	1/10
60	1	½	½	¼	1/10	1/10
61	1	½	½	¼	1/10	1/10
62	1	1/10	½	1/10	1/10	1/10
63	1/10	1/10	½	1/10	1/10	1/10
64	1/10	1/10	1/10	1/10	1/10	1/10
65	½	½	½	1/10	1/10	1/10
66	½	½	½	1/10	1/10	1/10
67	½	½	½	1/10	1/10	1/10
68	½	½	½	1/10	1/10	1/10
69	½	1/10	½	1/10	1/10	1/10
70	½	½	½	1/10	1/10	1/10
71	½	½	½	1/10	1/10	1/10
72	½	½	1/10	1/10	1/10	1/10
73	1/10	½	1/10	1/10	1/10	1/10
74	½	½	1/10	1/10	1/10	1/10
75	½	½	1/10	1/10	1/10	1/10
76	½	½	1/10	1/10	1/10	1/10
77	½	1/10	1/10	1/10	1/10	1/10
78	1/10	½	1/10	1/10	1/10	1/10
79	1/10	½	1/10	1/10	1/10	1/10
80	1/10	½	1/10	1/10	1/10	1/10
81	½	½	1/10	1/10	1/10	1/10
82	½	½	1/10	1/10	1/10	1/10
83	½	½	1/10	1/10	1/10	1/10
84	½	½	1/10	1/10	1/10	1/10
85	½	½	1/10	1/10	1/10	1/10
86	1/10	1/10	1/10	1/10	1/10	1/10
87	½	1/10	1/10	1/10	1/10	1/10
88	½	1/10	1/10	1/10	1/10	1/10
89	½	1/10	1/10	1/10	1/10	1/10
90	½	1/10	1/10	1/10	1/10	1/10

Cost of Buildings.

Taken per inmate, the following buildings cost:—West London Workhouse, Holloway, £48; St. Pancras Infirmary, Highgate, £68; Chorlton Union Hospital, under £50; and, taking one pavilion, St. Thomas's Hospital, £250; Devon Pauper Lunatic Asylum, £115, and Hanwell Asylum, £162; Pentonville Prison also £162.

At per foot cube, the expense of erection was:—Houses of Parliament, 2*s.* 6*d.*; British Museum, 1*s.* 6*d.*; Foreign Office, 1*s.* 0¾*d.*; Royal Exchange, 11*d.*; Colonial Chambers, Fenchurch Street, 10*d.*; St. Thomas's Hospital, 9*d.*; Manchester Assize Courts, 9½*d.*; Birmingham Exchange and Offices, 6*d.*

Table of Calculations for Purchasing Building Land according to the Lancashire System.

per yard per ann.	per acre per ann. £	s.	d.		At Years' Purchase. 20 £	s.	d.	21 £	s.	d.	22 £	s.	d.
¼*d.* ..	5	0	10	which is	100	16	8	105	17	6	110	18	4
½ ..	10	1	8	„	201	13	4	211	15	0	221	16	8
¾ ..	15	2	6	„	302	10	0	317	12	6	332	15	0
1 ..	20	3	4	„	403	6	8	423	10	0	443	13	4
2 ..	40	6	8	„	806	13	4	847	0	0	887	6	8
3 ..	60	10	0	„	1210	0	0	1270	10	0	1331	0	0
4 ..	80	13	4	„	1613	6	8	1694	0	0	1774	13	4
5 ..	100	16	8	„	2016	13	4	2117	10	0	2218	6	8
6 ..	121	0	0	„	2420	0	0	2541	0	0	2662	0	0
1*s.* ..	242	0	0	„	4840	0	0	5082	0	0	5334	0	0

per yard per ann.	per acre per ann. £	s.	d.		23 £	s.	d.	24 £	s.	d.	25 £	s.	d.
¼*d.* ..	5	0	10	which is	115	19	2	121	0	0	126	0	10
½ ..	10	1	8	„	231	18	4	242	0	0	252	1	8
¾ ..	15	2	6	„	347	17	6	363	0	0	378	2	6
1 ..	20	3	4	„	463	16	8	484	0	0	504	3	4
2 ..	40	6	8	„	927	13	4	968	0	0	1008	6	8
3 ..	60	10	0	„	1391	10	0	1452	0	0	1512	10	0
4 ..	80	13	4	„	1855	6	8	1936	0	0	2016	13	4
5 ..	100	16	8	„	2319	3	4	2420	0	0	2520	16	8
6 ..	121	0	0	„	2783	0	0	2904	0	0	3025	0	0
1*s.* ..	242	0	0	„	5566	0	0	5808	0	0	6050	0	0

VELOCITY OF SOUND.

32° Fahr.	..	..	..	velocity,	1092 ft.	per second.
62° „	..	..	..	„	1125	„
90° „	..	..	..	„	1155	„

VENTILATION.

Each person requires at least from 3 to 4 cubic feet of air per minute.

Ordinary windows allow about 8 cubic feet of air to pass per minute.

Sleeping rooms require 1000 cubic feet of space to each person.

VENTILATION OF ROOMS, &c.

Tredgold's rule is, "Multiply the number of people the room is to contain by 4, and divide this product by 43 times the square root of the height of the tubes in feet, and the quotient is the area of the ventilation tube or tubes in feet." The following Table from Mr. Hood's work shows the quantity of air in cubic feet discharged per minute through a ventilator of which the area is a square foot.

Height of Ventilator in Feet.	Difference between Temperature in Room and External Air.					
	5°	10°	15°	20°	25°	30°
10	116	164	200	235	260	284
15	142	202	245	284	318	324
20	164	232	285	330	368	404
25	184	260	318	368	410	450
30	201	284	347	403	450	493
35	218	306	376	436	486	531
40	235	329	403	465	518	570
45	248	348	427	493	551	605
50	260	367	450	518	579	635

VENTILATION OF DRAINS.

A simple method is to continue the soil pipe upwards from the drain pipe to a height of 4 or 5 feet above the eaves, and terminating with an open top, taking care to keep the ventilating pipe away from windows and chimneys. The soil pipes from the water-closets should be short branches into this pipe, each water-closet being trapped.

WARMING BY STEAM. (Molesworth.)

When the external temperature is 10° below freezing point, in order to maintain a temperature of 60° :—

One superficial foot of steam-pipe for each 6 superficial feet of glass in the windows.

One superficial foot of ditto for every 6 cube of air escaping for ventilation per minute.

One superficial foot of ditto for every 120 feet of wall, roof, or ceiling.

One cube foot of boiler is required for every 2000 cube feet of space to be heated.

One horse-power boiler is sufficient for 50,000 cube feet of space.

Steam should be about 112°.

WARMING BY HOT WATER.

P = Temperature of pipes.
T = Temperature required in building.
t = Temperature of external air.
C = Cube feet of air to be warmed per minute.
L = Length of pipe in feet.

$$L = \frac{(P - t)(T - t)}{P - T} \times \cdot0045 \text{ C. for 4-in. pipe.}$$

$$L = \frac{(P - t)(T - t)}{P - T} \times \cdot006 \quad \text{„} \quad \text{3-in.} \quad \text{„}$$

$$L = \frac{(P - t)(T - t)}{P - T} \times \cdot009 \quad \text{„} \quad \text{2-in.} \quad \text{„}$$

WARMING BY RADIATORS.

1 foot super of radiator = 1 foot, 4-in. pipe.

WATER.

1 gallon of water = 0·16 cubic foot (approximately).
1 cubic foot of water = 6¼ gallons (approximately) = 62·5 lbs.
1 cwt. of water = 1·8 cubic foot.
1 ton of water = 36 cubic feet (nearly).
224 gallons of water = 1 ton.

Sea Water.

1 cubic foot of sea water = 64$\frac{1}{10}$ lb.
Weight of sea water = 1·027 weight of fresh water.
Water expands in freezing $\frac{1}{13}$th part of its bulk.

WATER SUPPLY.

Provide 16 to 20 gall. per head per day in non-manufacturing towns.
Provide 20 to 30 gall. per head per day in manufacturing towns.
Service tanks should contain three days' supply.
Impounding reservoirs should contain from 120 to 200 days' supply.

WATERWORKS.

Rules for Water Supply. (Rawlinson.)

1. Water supply may be gravitating, or the water may be pumped by steam power.

2. As a rule, gravitating works require the largest outlay.

3. The annual working expenses of a pumping scheme will frequently be greatest.

4. No puddle wall to be less in width at the top water-line, in any part of the embankment, than 8 feet, and to increase for each foot of vertical height not less than 1 inch in width on each side of such puddle wall down to the ground-line at the deepest part of the embankment. The puddle trench to be filled entirely with puddle.

5. The inner slope to an embankment should not be less than 3 horizontal to 1 vertical. The outer slope should not be less than 2½ horizontal to 1 vertical.

6. Embankments should be formed in layers of earth not more than 12 inches deep, spread evenly over the entire area of such embankment.

7. The finished top bank width of any reservoir should not be less than the following dimensions, namely:—

An embankment 25 ft. deep, not less than 6 ft. wide.
„ 50 „ „ 12 „
„ 75 „ „ 18 „

Intermediate, or lesser or greater depths of embankment may have proportionately arranged widths.

8. The finished top bank level of any reservoir not to be at less than the following elevations above the edge of the by-wash or top water-line of a full reservoir, namely:—

An embankment 25 ft. deep, not less than 4 ft.
„ 50 „ „ 5 „
„ 75 „ „ 6 „

9. Intermediate, or lesser or greater depths of embankment may have proportionately arranged relative top bank and by-wash levels.

10. Each impounding reservoir to have full and free by-wash space not less than 3 feet in length for every hundred acres of gathering-ground; such by-wash, where practicable, to be formed in the solid ground.

11. Cast-iron pipes, culverts of timber, or other material liable to

decay, should not be used for outlet discharge, or for overflow works, if required to be buried.

12. Valves and sluices should be placed within the line of puddle wall.

13. A reservoir embankment should at all times be preserved at its full height, and the relative level of the top bank and by-wash be preserved.

14. Reservoirs for service distribution should be covered. Water should not be exposed in open reservoirs and tanks after filtration.

15. Cast-iron pipes, properly varnished, should be used for street mains. It is not advisable to use mains less in internal diameter than 3 inches.

16. Lead should not be used either in service pipes or in house cisterns. Wrought-iron tubes with screw joints may be used for house service. All house taps should have screw joints, and be of the description known as screw-down, so as to admit of easy repairs.

17. In jointing and fixing wrought-iron service pipes care should be taken to insert double screw joints at convenient points, to allow the removal of a length of pipe for alterations and repairs.

18. Up-bends should be avoided, or a tap should be inserted to allow any accumulation of air to escape.

19. Wrought-iron service pipes are cheaper, stronger, and more easily fitted than service pipes of lead. Certain sorts of made ground in towns act rapidly and injuriously on both lead and iron pipes—furnace ashes, waste gas and chemical refuse, old building refuse containing lime, and other such material. Pipes should not be laid in such material without a lining of sand or puddle, or other special protection.

20. Earthenware pipes may be used for water conduits, provided the joints are not placed under pressure.

A public supply of water should not be less in volume than 20 gallons daily per head of the population. This in towns below 20,000 population will include water for public purposes and for trade requirements.

21. High pressure and constant service should be secured wherever practicable.

22. Water at and below six degrees of hardness is "soft" water; above this range water is "hard."

23. Hardness in water implies one grain of bicarbonate or sulphate of lime in each gallon of water.

Each degree of hardness destroys 2½ oz. of soap in each 100 gallons of water used for washing. Soft water is therefore, commercially, of more value than hard water in proportion to the worth of 5 oz. of soap to each 200 gallons for each degree of hardness. But soft water is also more wholesome, and effects saving in other operations—tea-making, and in generating steam power.

WATER PIPES. (Molesworth.)

To bear a pressure of 200 feet of water or proof of 400 feet.

Bore in Inches.	Thickness of Metal.	Depth of Socket.	Thickness of Socket.	Space for Packing.	Weight of 9-feet Length.*	Weight of Lead Joint.
	inches.	inches.	inches.	inches.	cwt. qr. lb.	lb.
3	1/16	3	1/4	1/4	0 3 24	2·4
4	5/16	3	1/4	1/4	1 1 14	3·6
5	3/8	3¼	1/4	3/8	1 2 16	6·0
6	3/8	3¼	1/4	3/8	2 0 0	8·2
7	3/8	3¼	1/4	3/8	2 1 4	8·7
8	7/16	3¼	1/4	3/8	3 0 4	9·9
9	7/16	4	1/4	3/8	3 1 19	13·9
10	1/2	4	1/4	3/8	4 1 16	14·9
11	1/2	4	1/4	3/8	4 2 22	15·9
12	9/16	4	1/4	3/8	5 2 24	17·2
14	5/8	4	1/4	3/8	7 2 4	20·8

* The 9-feet length is taken from the end of one pipe to the end of the next when laid.

CAST-IRON PIPES—PRESSURE IN.

Let H = Head of water in feet.
P = Pressure of water in lb. per square inch.
d = Internal diameter of pipe in inches.
t = Thickness of metal in inches.

$$P = 0{\cdot}433\,H.$$

$$t = 0{\cdot}000054\,H\,d + x.$$

or $$t = {\cdot}000125\,P.d + x.$$

x = ·37 in. for pipes less than 12 in. diam.
= ·5 for pipes from 12 to 30 inches.
= ·6 for pipes from 30 to 50 in. diameter.

DELIVERY OF WATER IN PIPES. (Eytelwein.)

D = Diameter of pipe in inches.
H = Head of water in feet.
L = Length of pipe in feet.
W = Cubic feet of water discharged per minute.

$$W = 4{\cdot}72\sqrt{\frac{D^5\,H}{L}}. \qquad D = 538\sqrt[5]{\frac{L\,W^2}{H}}.$$

L

Hawksley's Formula for the Delivery of Water in Pipes.

G = Number of gallons delivered per hour.
L = Length of pipe in yards.
H = Head of water in feet.
D = Diameter of pipe in inches.

$$D = \frac{1}{15}\sqrt[5]{\frac{G^2 L}{H}}. \qquad G = \sqrt{\frac{(15\ D)^5 H}{L}}.$$

Friction of Long Pipes (Box's Formula.)*

The loss of head by friction may be calculated by the following rules:—

$$G = \left(\frac{(3^d)^5 \times H}{L}\right)^{\frac{1}{2}}. \qquad H = \frac{G^2 \times L}{(3^d)^5}.$$

$$d = \left(\frac{G^2 \times L}{H}\right)^{\frac{1}{5}} \div 3. \qquad L = \frac{(3^d)^5 \times H}{G^2}.$$

In these rules d = diameter of pipe in inches.
L = length in yards.
H = head of water in feet.
G = gallons per minute.

WELLS.

Table showing Quantity of Bricks and Digging in Wells and Cylindrical Sewers for each Foot in Depth or Length.

Diameter in the Clear.	Half Brick Run.				One Brick Run.			
	Cubic Feet of Digging.	Number of Bricks.		Cubic Feet of Brickwork.	Cubic Feet of Digging.	Number of Bricks.		Cubic Feet of Brickwork.
		Laid Dry.	In Mortar.			Laid Dry.	In Mortar.	
1·0	2½	28	24	1·6	4⅛	75	60	4·2
1·6	4	42	34	2·3	7	100	84	5·5
2·0	6	50	42	2·8	10	125	100	6·5
2·6	8½	60	50	3·4	12⅝	142	118	7·8
3·0	11	70	58	4·0	15½	164	136	9·0
3·6	14½	80	66	4·6	20	182	150	10·1
4·0	18	89	74	5·2	24	200	164	11·2
4·6	21½	100	82	5·8	28½	214	180	12·4
5·0	26	110	90	6·4	33½	240	198	13·6
6·0	36	130	106	7·6	44½	278	230	16·0
7·0	47½	150	122	8·7	57	318	264	18·3
8·0	60 1/15	170	140	9·9	70 1/15	358	295	20·7
9·0	74½	190	155	11·0	86⅝	396	328	23·0
10·0	90 2/15	218	172	12·2	103 1/15	435	360	25·4

Box's Tables, published by Spon.

POWER REQUIRED TO RAISE WATER FROM DEEP WELLS.

Quantity of Water raised per hour.	Maximum depth from which the quantity can be raised by each unit of power.			
	One Man turning a Crank.	One Donkey working a Gin.	One Horse working a Gin.	One Horse-Power Steam Engine.
225 gallons	80 ft.	160 ft.	560 ft.	880 ft.
360 „	50 „	100 „	350 „	550 „
520 „	35 „	70 „	245 „	385 „
700 „	25 „	50 „	175 „	275 „
900 „	20 „	40 „	140 „	220 „

WEIGHT OF METALS.

WROUGHT IRON.

Cubic inches × ·28 = lb. avoirdupois.
„ ÷ 100 = qr.
„ ÷ 400 = cwt.
Thickness of plates in inches × 40 = lb. per sq. ft.
„ „ eighths × 5 = „ „
„ „ tenths × 4 = „ „
Sectional area in inches × 3·34 = lb. per lin. ft.
„ „ eighths × ·052 = „ „
„ „ inches × 10 = lb. per lin. yd.
Lb. per lineal yard × ·7857 = tons per mile run.
Diameter of round iron in inches squared × 2·64 = lb. per foot run.

VARIOUS METALS.

Multipliers to convert the weights as found above into the weights of other metals.

Weight of wrought iron × ·92 = weight of zinc.
„ „ „ × ·93 = „ cast iron.
„ „ „ × ·94 = „ tin.
„ „ „ × 1·02 = „ steel.
„ „ „ × 1·09 = „ brass.
„ „ „ × 1·15 = „ copper.
„ „ „ × 1·47 = „ lead.

Cube in.	wrought iron	×	·252 =	lb.	of zinc.
,,	,, ,,	×	·26 =	,,	cast iron.
,,	,, ,,	×	·262 =	,,	tin.
,,	,, ,,	×	·288 =	,,	steel.
,,	,, ,,	×	·3 =	,,	brass.
,,	,, ,,	×	·32 =	,,	copper.
,,	,, ,,	×	·41 =	,,	lead.

WEIGHT OF A SUPERFICIAL FOOT OF WROUGHT AND CAST IRON, BRASS, COPPER, AND LEAD.

	Parts of an inch in thickness.								
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Wt. iron.	2·52	5·04	10·08	15·12	20·16	25·20	30·24	35·28	40·32
Cast iron.	2·35	4·69	9·37	14·06	18·75	23·44	28·12	32·81	37·50
Brass ..	2·84	5·68	11·35	17·03	22·70	28·38	34·05	39·72	45·40
Copper ..	2·89	5·78	11·56	17·34	23·12	28·90	34·68	40·46	46·24
Lead, cast	3·70	7·39	14·78	22·17	29·56	36·95	44·34	51·73	59·12
Zinc.....	2·34	4·69	9·38	14·06	18·75	23·44	28·13	32·81	37·50

WEIGHT OF CAST-IRON BALLS AND SOLID CYLINDERS IN LB.

	Diameter in Inches.								
	1	2	3	4	5	6	7	8	9
Cast-iron balls	·136	1·10	3·70	8·7	17·1	29·5	47	70	100
Cast-iron cylinder 1 ft. long ..	2·4	9·9	21·9	39·0	61·0	89·0	120	156	198

WEIGHT OF ANGLE AND T IRON.

RULE FOR CALCULATING WEIGHT OF ORDINARY ANGLE AND T IRON.

W = Weight of angle-iron per lineal foot.
B = Breadths of flanges added in decimal parts of a foot.
T = Thickness of angle-iron in decimal parts of a foot.
w = Weight of iron in lb. per sq. ft. of the thickness of the angle-iron.

$$W = B - T \times w.$$

TABLE OF THE WEIGHTS PER FOOT RUN, AND SECTIONAL AREAS OF EQUAL-SIDED ANGLE AND T IRONS.

The L and T irons are taken as uniformly thick in each part.

Breadth of flanges added in in. and parts.	Thickness in parts of an inch.																		Breadth of flanges added in in. and parts.
	4/16		5/16		6/16		7/16		8/16		9/16		10/16		11/16		12/16		
	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	
3	2·31	·69	2·82	·84	3·31	·99	3·77	1·12	4·20	1·26	—	—	—	—	—	—	—	—	3
3¼	2·52	·75	3·08	·92	3·62	1·08	4·14	1·20	4·62	1·38	—	—	—	—	—	—	—	—	3¼
3½	2·73	·81	3·35	1·00	3·94	1·18	4·51	1·35	5·04	1·51	—	—	—	—	—	—	—	—	3½
3¾	2·94	·88	3·61	1·08	4·25	1·27	4·88	1·46	5·46	1·63	—	—	—	—	—	—	—	—	3¾
4	3·15	·94	3·88	1·16	4·57	1·37	5·24	1·57	5·88	1·76	6·50	1·94	7·09	2·12	7·65	2·29	8·19	2·45	4
4¼	3·57	1·06	4·40	1·32	5·20	1·50	5·98	1·76	6·72	2·01	7·44	2·23	8·14	2·44	8·81	2·64	9·45	2·82	4¼
5	3·99	1·19	4·92	1·47	5·83	1·74	6·71	2·00	7·56	2·26	8·39	2·52	9·19	2·75	9·96	2·93	10·71	3·15	5
5¼	4·41	1·32	5·45	1·63	6·46	1·93	7·45	2·23	8·40	2·51	9·33	2·79	10·24	3·07	11·12	3·33	11·97	3·58	5¼
6	4·83	1·44	5·97	1·78	7·09	2·12	8·18	2·44	9·24	2·77	10·28	3·08	11·29	3·38	12·27	3·67	13·23	3·96	6
6¼	5·25	1·57	6·50	1·94	7·72	2·31	8·92	2·67	10·08	3·02	11·22	3·36	12·34	3·69	13·43	4·02	14·49	4·34	6¼
7	5·67	1·69	7·02	2·10	8·35	2·50	9·65	2·88	10·92	3·28	12·17	3·65	13·39	4·01	14·58	4·36	15·75	4·72	7
7¼	6·09	1·82	7·55	2·26	8·98	2·69	10·39	3·11	11·76	3·52	13·11	3·92	14·44	4·32	15·74	4·72	17·02	5·11	7¼
8	6·51	1·95	8·07	2·41	9·61	2·86	11·12	3·32	12·60	3·77	14·06	4·22	15·49	4·64	16·89	5·06	18·27	5·47	8
8¼	6·93	2·07	8·60	2·57	10·24	3·07	11·86	3·55	13·44	4·02	15·00	4·49	16·54	4·95	18·05	5·40	19·53	5·82	8¼
9	7·35	2·20	9·12	2·73	10·97	3·25	12·59	3·77	14·28	4·28	15·95	4·78	17·59	5·27	19·20	5·75	20·79	6·22	9
9¼	7·77	2·33	9·65	2·89	11·50	3·44	13·32	3·98	15·12	4·53	16·89	5·06	18·64	5·58	20·36	6·09	22·05	6·60	9¼
10	8·19	2·45	10·17	3·04	12·13	3·63	14·06	4·20	15·96	4·77	17·84	5·34	19·69	5·89	21·51	6·44	23·31	6·98	10
10¼	8·61	2·58	10·69	3·20	12·76	3·82	14·80	4·43	16·80	5·03	18·78	5·62	20·74	6·21	22·67	6·78	24·57	7·35	10¼
11	9·03	2·70	11·22	3·35	13·39	4·00	15·53	4·65	17·64	5·28	19·73	5·91	21·79	6·52	23·82	7·13	25·83	7·73	11
11¼	9·45	2·82	11·75	3·52	14·02	4·20	16·27	4·86	18·48	5·53	20·67	6·19	22·84	6·84	24·88	7·48	27·09	8·11	11¼
12	9·87	2·92	12·27	3·66	14·65	4·38	17·00	5·09	19·32	5·78	21·62	6·47	23·89	7·15	26·13	7·82	28·36	8·48	12

The weights are given in pounds and decimal parts; the sectional areas are given in inches and decimal parts.

WEIGHT OF CAST-IRON PIPES IN LB. PER LINEAL FOOT.

The weight of the two flanges may be reckoned = weight of one foot.

Bore. Inches.	Thickness of Metal.							
	⅜	½	⅝	¾	⅞	1	1¼	1½
2	8·7	12·3	16·1	—	—	—	—	—
3	12·4	17·1	22·2	—	—	—	—	—
4	16·1	22·1	28·3	—	—	—	—	—
5	19·8	26·9	34·4	42·3	—	—	—	—
6	23·4	31·9	40·6	49·7	—	—	—	—
7	27·1	36·8	46·7	56·8	—	—	—	—
8	30·8	41·6	52·8	64·3	—	—	—	—
9	34·4	46·0	58·9	71·7	—	—	—	—
10	—	51·4	65·1	79	93·3	—	—	—
11	—	56·4	71	86·4	101·8	—	—	—
12	—	—	77·3	93·7	110·4	127·4	—	—
14	—	—	89·6	108·4	127·5	147	—	—
15	—	—	—	115·7	136·1	156·8	177·7	—
16	—	—	—	123·1	144·7	166·6	188·7	—
18	—	—	—	137·9	161·8	186·2	210·8	—
20	—	—	—	—	178·9	205·8	232·9	260·3
22	—	—	—	—	—	225·4	254·9	284·8
24	—	—	—	—	—	245·0	276·9	309·3

New B. W. Gauge, see page 147.

WEIGHT OF BELLS.

Size. Diameter.	Approximate Weight.		
	cwt.	qr.	lb.
6 inches	—	—	4½
7 „	—	—	6½
8 „	—	—	11
9 „	—	—	16
10 „	—	—	22
12 „	—	1	16
14 „	—	2	12
16 „	1	—	12
20 „	1	3	—
25 „	3	2	—
30 „	5	3	—
35 „	8	—	—
40 „	12	—	—
45 „	16	—	—
50 „	23	—	—

Weight of Copper Pipes in lb. per Foot Lineal.

Bore. Inches.	Thickness in parts of inch.			
	1/16	1/8	3/16	1/4
1/2	·42	·94	1·60	2·27
3/4	·62	1·33	2·17	3·02
1	·79	1·69	2·66	3·77
1 1/2	1·15	2·44	3·85	5·30
2	1·55	3·21	5·00	6·80
2 1/2	1·94	3·97	6·13	8·31
3	2·3	4·73	7·24	9·84

Weight of a Square Foot of Sheet Metals in lb.

Thickness Birmingham Wire Gauge.

Thickness. B. W. G.	Iron.	Copper.	Brass.	Thickness. B. W. G.	Iron.	Copper.	Brass.
30	·5	·58	·55	15	2·82	3·27	3·10
29	·56	·64	·61	14	3·12	3·60	3·43
28	·64	·74	·70	13	3·75	4·34	4·12
27	·72	·83	·79	12	4·38	5·08	4·81
26	·80	·92	·88	11	5·00	5·80	5·50
25	·90	1·04	·99	10	5·62	6·50	6·18
24	1·00	1·16	1·10	9	6·24	7·20	6·86
23	1·12	1·30	1·23	8	6·86	7·90	7·54
22	1·25	1·45	1·37	7	7·50	8·70	8·25
21	1·40	1·62	1·54	6	8·12	9·40	8·93
20	1·54	1·78	1·69	5	8·74	10·10	9·61
19	1·70	1·97	1·87	4	10·00	11·60	11·00
18	1·86	2·15	2·04	3	11·00	12·75	12·10
17	2·18	2·52	2·40	2	12·00	13·90	13·10
16	2·50	2·90	2·75	1	12·50	14·50	13·75

Hoop Iron.—Dimensions and Weight in lb. per foot run.

Breadth	1/8	3/16	1/4	1 in.	1 1/8	1 1/4
B. W. Gauge	21	20	19	18	17	16
Weight per lineal foot .	·0666	·0875	·1216	·1636	·21	·27
Breadth	1 3/8	1 1/2	1 3/4	2 in.	2 1/4	2 1/2
B. W. Gauge	15	15	14	13	13	12
Weight per lineal foot .	·33	·36	·484	·634	·714	·91

Hoop Iron.—Weight of 100 Lineal Feet.

B. W. Gauge.	Width in in.	Weight in lb.	B. W. Gauge.	Width in in.	Weight in lb.
11	3	126·30	15	1½	36·38
11	2⅞	115·78	15	1⅜	33·34
12	2½	91·78	16	1¼	26·52
12	2	73·42	17	1⅛	20·84
13	2¼	71·23	18	1	16·17
13	2	63·32	19	⅞	12·39
13	1⅞	55·41	20	¾	8·84
14	1¾	47·15	20	⅝	6·95
14	1½	40·42	—	—	—

Weight of a Lineal Foot of Flat Bar Iron in lb.

Breadth in inches	Thickness in fractions of an inch.								
	⅛	3/16	¼	⅜	½	⅝	¾	⅞	1
1	·42	·63	·84	1·26	1·68	2·09	2·51	2·93	3·36
1⅛	·47	·70	·94	1·41	1·88	2·35	2·82	3·30	3·77
1¼	·53	·78	1·05	1·57	2·09	2·61	3·14	3·67	4·19
1⅜	·58	·86	1·15	1·73	2·30	2·88	3·45	4·03	4·61
1½	·62	·95	1·26	1·88	2·51	3·14	3·76	4·40	5·02
1⅝	·67	1·02	1·36	2·04	2·72	3·41	4·09	4·73	5·45
1¾	·74	1·10	1·47	2·20	2·93	3·67	4·40	5·14	5·87
1⅞	·79	1·17	1·57	2·35	3·14	3·93	4·71	5·50	6·29
2	·83	1·25	1·68	2·51	3·35	4·19	5·03	5·89	6·71
2⅛	·89	1·33	1·78	2·67	3·56	4·45	5·34	6·24	7·13
2¼	·94	1·41	1·88	2·82	3·77	4·71	5·66	6·61	7·15
2⅜	1·00	1·49	1·99	2·98	3·97	4·97	5·98	6·98	7·97
2½	1·04	1·57	2·09	3·15	4·18	5·23	6·29	7·34	8·39
2⅝	1·10	1·65	2·20	3·29	4·39	5·49	6·60	7·71	8·81
2¾	1·15	1·73	2·30	3·44	4·60	5·76	6·91	8·07	9·22
2⅞	1·20	1·81	2·41	3·62	4·82	6·03	7·24	8·45	9·65
3	1·25	1·89	2·51	3·77	5·03	6·29	7·55	8·81	10·07
3⅛	1·36	2·04	2·72	4·09	5·45	6·81	8·18	9·54	10·91
3¼	1·46	2·20	2·93	4·40	5·86	7·33	8·80	10·28	11·74
3⅜	1·57	2·35	3·14	4·70	6·28	7·85	9·43	11·00	12·57
4	1·67	2·52	3·35	5·02	6·70	8·38	10·07	11·75	13·42
4⅛	1·78	2·67	3·56	5·34	7·11	8·90	10·69	12·48	14·25
4¼	1·89	2·82	3·77	5·65	7·53	9·42	11·32	13·21	15·09
4⅜	2·00	3·00	3·98	5·96	7·95	9·94	11·94	13·94	15·92
5	2·10	3·15	4·19	6·28	8·37	10·47	12·57	14·67	16·76
5⅛	2·20	3·31	4·40	6·59	8·79	11·00	13·20	15·41	17·61
5¼	2·31	3·45	4·61	6·90	9·21	11·52	13·83	16·14	18·45
5⅜	2·41	3·61	4·82	7·22	9·63	12·04	14·46	16·87	19·28
6	2·52	3·78	5·03	7·53	10·05	12·57	15·06	17·60	20·13

Sheet Iron.—Weight of a Superficial Foot.

B. W. Gauge.	Dec. of an inch.	Weight in lb.	B. W. Gauge.	Dec. of an inch.	Weight in lb.
00000 ($\frac{1}{2}$)	·500	20·21	16 ($\frac{1}{16}$)	·063	2·55
0000	·450	18·19	17	·055	2·22
000	·437	17·66	18	·048	1·94
00 ($\frac{3}{8}$)	·375	15·16	19	·042	1·70
0	·340	13·74	20	·035	1·42
1 ($\frac{5}{16}$)	·312	12·61	21	·033	1·33
2	·284	11·48	22	·029	1·17
3	·261	10·55	23	·028	1·13
3—4 ($\frac{1}{4}$)	·250	10·10	24	·025	1·01
4	·239	9·66	25	·021	·85
5	·217	8·77	26	·020	·81
6	·208	8·41	27	·018	·73
7 ($\frac{3}{16}$)	·187	7·56	28	·015	·61
8	·166	6·71	29	·013	·53
9	·158	6·39	30	·012	·49
10	·137	5·54	31	·010	·40
11 ($\frac{1}{8}$)	·125	5·05	32	·009	·36
12	·109	4·41	33	·008	·32
13	·094	3·80	34	·007	·28
14	·080	3·23	35	·005	·20
15	·072	2·91	36	·004	·16

New Birmingham Wire Gauge, see p. 147.

Weight of a Lineal Foot of Round and Square Bar Iron in lb.

Diameter or Side.	Square Bars.	Round Bars.	Breadth or Diam. in inches.	Square Bars.	Round Bars.	Breadth or Diam. in Inches.	Square Bars.	Round Bars.
$\frac{1}{8}$	·209	·164	1$\frac{1}{16}$	5·25	4·09	3	30·07	23·60
$\frac{5}{16}$	·326	·256	1$\frac{1}{8}$	6·35	4·96	3$\frac{1}{4}$	35·28	27·70
$\frac{3}{8}$	·470	·369	1$\frac{1}{4}$	7·51	5·90	3$\frac{1}{2}$	40·91	32·13
$\frac{7}{16}$	·640	·502	1$\frac{5}{16}$	8·82	6·92	3$\frac{3}{4}$	46·97	36·89
$\frac{1}{2}$	·835	·656	1$\frac{3}{8}$	10·29	8·03	4	53·44	41·97
$\frac{9}{16}$	1·057	·831	1$\frac{7}{16}$	11·74	9·22	4$\frac{1}{4}$	60·32	47·38
$\frac{5}{8}$	1·305	1·025	2	13·36	10·49	4$\frac{1}{2}$	67·63	53·12
$\frac{11}{16}$	1·579	1·241	2$\frac{1}{16}$	15·08	11·84	4$\frac{3}{4}$	75·35	59·18
$\frac{3}{4}$	1·879	1·476	2$\frac{1}{8}$	16·91	13·27	5	83·51	65·58
$\frac{13}{16}$	2·205	1·732	2$\frac{3}{16}$	18·84	14·79	5$\frac{1}{4}$	92·46	72·30
$\frac{7}{8}$	2·556	2·011	2$\frac{1}{4}$	20·87	16·39	5$\frac{1}{2}$	101·03	79·35
$\frac{15}{16}$	2·936	2·306	2$\frac{5}{16}$	23·11	18·07	5$\frac{3}{4}$	110·43	86·73
1	3·34	2·62	2$\frac{3}{8}$	25·26	19·84	6	120·24	94·43
1$\frac{1}{8}$	4·22	3·32	2$\frac{7}{16}$	27·61	21·68	—	—	—

To convert into weight of other metals, multiply tabular No. for cast iron by ·93, for steel × 1·02, for copper × 1·15, for brass × 1·09, for lead × 1·47, for zinc × ·92.

Weight of Nuts and Bolt-heads in lb.

Diameter of bolt in inches ..	¼	⅜	½	⅝	¾	⅞
Weight of hexagon nut and head	·017	·057	·128	·267	·43	·73
Weight of square nut and head	·021	·069	·164	·320	·55	·88

Diam. of bolt in inches	1	1¼	1½	1¾	2	2¼	3
Weight of hexagon nut and head	1·10	2·14	3·78	5·6	8·75	17	28·8
Weight of square nut and head	1·31	2·56	4·42	7·0	10·5	21	36·4

Weight of Lead Pipes in lb. per Foot Lineal.

Bore. Inch.	Common.	Middling.	Strong.
	lb.	lb.	lb.
½	1·07	—	—
¾	1·6	1·8	2
1	2·0	2·6	2·8
1¼	3·0	3·7	4·4
1½	4·0	4·7	5·6
2	5·0	6·0	7·0
2½	7·0	8·6	10·0

Chains.—Weight of Lineal Foot.

Diam. of Link in in.	Weight in lb.	Diam. of Link in in.	Weight in lb.	Diam. of Link in in.	Weight in lb.
¼	·63	¾	5·33	1¼	14·50
5/16	·91	13/16	6·16	1 5/16	16·00
⅜	1·33	⅞	7·16	1⅜	17·66
7/16	1·50	15/16	8·16	1½	20·83
½	2·33	1	9·33	1⅝	24·17
9/16	3·00	1 1/16	10·50	1¾	28·33
⅝	3·67	1⅛	11·83	1⅞	32·50
11/16	4·50	1 3/16	13·16	2	38·33

Weight of Spikes.

5-inch	..	..	..	=	10 lb.	per hundred.
6	„	..	..	=	20 „	„
7	„	..	..	=	30 „	„
8	„	..	..	=	45 „	„
9	„	..	..	=	60 „	„

Flooring Brads.

2 inches long	..	..	weight	4 lb.	per 1000.
2½ „	..	..	„	10 „	„
2¾ „	..	..	„	15 „	„
3¼ „	..	..	„	20 „	„

Weight of Nails for Slating.

Composition.

1½ in. long	..	..	=	5 lb.	15 oz. per 1000.
1¾ „	..	..	=	8 „	1 „ „

Wrought-copper Nails (Strong).

1 in. long	..	..	=	3 lb.	4 oz.	per 1000.
1½ „	..	..	=	9 „	9 „	„
2 „	..	..	=	11 „	4 „	„
2½ „	..	..	=	29 „	4 „	„
3 „	..	..	=	40 „	0 „	„

Coppers.

A 2-gallon copper	weighs	..	..	about	3 lb.
A 4 „	„	„	..	„	6 „
A 6 „	„	„	..	„	9 „
A 9 „	„	„	..	„	14 „
A 12 „	„	„	..	„	18 „
A 15 „	„	„	..	„	23 „

Weight of Metals per Cubic Foot in Lb.

Aluminium	162
Brass, cast	525
Bronze	524
Copper, cast	550
„ sheet	555
Gun-metal	549
Iron, wrought	487
„ cast	450
Lead, milled	712
„ cast	710
Steel	490
Tin, cast	456
Type-metal	653
Zinc	459

WEIGHT OF MISCELLANEOUS ARTICLES.

Articles.	Weight of a Cubic Foot.	Cubic Feet = 1 ton.
	lbs.	
Ashes	37	60½
Asphalte	156	—
Bath stone	123	—
Brickwork, in mortar	110	22
„ in cement	112	20
Caen stone	125	—
Cement, Portland	78	—
„ Roman	60	—
„ „ and sand, equal parts	112	—
Chalk from	140	15¼
Chalk to	166	13¾
Clay from	120	18⅔
Clay to	125	17
Coal from	50	26⅔
Coal to	58	45
„ Navy allowance	—	48
Coke	47	48
Concrete	120	18⅔
Earth from	95	18
Earth to	126	23¼
Flint	164	13⅔
Glass, crown	157	14¼
„ flint	187	12
„ plate	184	12⅛
Granite, Aberdeen	166	—
„ Cornish	166	—
„ Guernsey	185	—
Gravel	112	21¼
„ coarse	120	18⅔
Hay	5	Truss = 56 to 60 lbs.
„ well pressed	8	—
Iron, cast	450	5
„ wrought	487	4⅝
Kentish ragstone	166	—
Lime, stone	53	42¼
„ chalk	44	51
Marble, average	170	—
Marl	120	18
Masonry, rubble	140	—
„ flint	148	—
Mortar, old	88	25¼
„ new	119	19
Night-soil	—	18
Plaster of Paris, cast	80	—
Portland stone	145	—
Sand, from	90	23¼ to 25
„ river	118	19
Sandstone, Craigleith	145	—
Shingle	89	25¼
Slate	180	12⅔
Snow	8	—

WEIGHT OF MISCELLANEOUS ARTICLES—*continued.*

Articles.	Weight of a Cubic Foot.	Cubic Feet = 1 ton.
	lbs.	
Straw	3¼	{ Truss = 36 lbs.
„ well pressed	5½	—
Tar	63	—
Thames ballast	—	20
Tiles, average	12	20
Water	62½	35¾
„ sea	64	35
Whinstone, Scotch	172	—
Yorkshire paving	156	—

Weight of Timber, Stone, &c., see under their respective names.

WIND, PRESSURE OF, AGAINST WALLS, &c.

Force per Square Foot.	Authority.
57¼ lbs.	Tredgold.
55 „	Dr. Nichol.

To determine the pressure of wind per square foot, equal to the stability of a square stalk.

Rule.—Multiply the weight of the stalk in pounds by twice its width in feet at the base, and divide the product by the square of its height in feet and by the sum of its top and bottom breadths in feet.

Example:

Let w = Weight of stalk in pounds = 90,000.
p = Pressure of wind in pounds per square foot equal to stability of stalk.
h = Height of stalk in feet = 50 feet.
b = Breadth of stalk at base in feet = 4 feet.
c = „ „ top „ = 2 „

Then $\frac{90{,}000 \times 4 \times 2}{2{,}500\,(4+2)} = p = 48$ pounds per square foot.

If the stalk be circular, proceed as before, but replace the breadths by the diameter, and multiply the result by 2.

PRESSURE OF WIND.

Miles per hour.	Pressure in lbs. per Square Foot.	Remarks.
1	0·005	Hardly perceptible.
2	0·020	Just perceptible.
3	0·044	
4	0·079	Gentle, pleasant wind.
5	0·123	
10	0·492	Brisk gale.
15	1·107	
20	1·968	Very brisk.
25	3·075	
30	4·429	High wind.
35	6·027	
40	7·873	Very high.
45	9·963	
50	12·300	Storm.
60	17·715	Great storm.
80	31·490	Hurricane.

ZINC, MEMORANDA.

Inferior zinc is spotty and unequal in colour, and is darker than the pure material.

In laying zinc all contact with iron or lime should be avoided.

24 oz. zinc is generally adopted for flats, and from 20 to 24 oz. zinc for gutters.

Zinc sheets are 7 ft. and 8 ft. long, and 2 ft. 8 and 3 ft. wide.

TABLE OF EQUIVALENT GAUGES AND WEIGHT PER SQUARE FOOT.

Zinc Gauge.	B.W.G.	Weight per Square Foot.
10	25	11½ ozs.
11	24	13 ,,
12	23	15 ,,
13	22	17 ,,
14	21	19 ,,
15	20	22 ,,
16	19	25 ,,

Zinc Gauge should be specified.

NEW BIRMINGHAM WIRE GAUGE.

Adopted by Iron Trade, 1884, at a meeting at Birmingham, Feb. 28th.

	"	Lbs. per ft. super.		"	Lbs. per ft. super.		"	Lbs. per ft. super.
000 ½"	·500	20·	9	·1398	5·592	20	·0392	1·568
00	·4452	17·808	10 ⅛"	·1250	5·0	21	·0349	1·396
0	·3694	14·856	11	·1113	4·452	22 $\frac{1}{32}$"	·03125	1·25
1	·3532	13·128	12	·0991	3·964	23	·0278	1·112
2	·3147	12·588	13	·0882	3·528	24	·0247	·988
3	·2804	11·216	14	·0785	3·140	25	·0220	·880
4 ¼"	·250	10·	15	·0609	2·796	26	·0196	·784
5	·2225	8·900	16 $\frac{1}{16}$"	·0625	2·50	27	·0174	·696
6	·1981	7·924	17	·0556	2·224	28 $\frac{1}{64}$"	·015625	·625
7	·1764	7·056	18	·0495	1·980	29	·0139	·556
8	·1570	6·28	19	·0440	1·760	30	·0123	·492

NELSON'S BLUE LIAS LIME

AND

PATENT SELENITIC CEMENT,

Prepared from Blue Lias Lime, much superior to that made from Grey Lime, and delivered in London at same price. Also

BEST PORTLAND CEMENT

AND

PLASTER & KEENE'S CEMENT.

All delivered by Rail and Boat to all parts of the Kingdom, and in London by Cart.

CHAS. NELSON & CO.,

LIMITED,

16 SOUTH WHARF, PADDINGTON, W.

(TELEPHONE No. 7135.)

CAMBRIAN WHARF, CRESCENT, BIRMINGHAM,

AND

80 DEANSGATE, MANCHESTER.

Or the Works: STOCKTON, RUGBY.

[*To face p.* 154.

Folio, cloth, £1 5s.

THE MUNICIPAL BUILDINGS, GLASGOW:

BY

WILLIAM YOUNG,

ARCHITECT.

AUTHOR OF 'TOWN AND COUNTRY MANSIONS,' 'PICTURESQUE ARCHITECTURAL STUDIES.'

With Twenty Collotype Illustrations by Bedford Lemere, &c.

Third Edition, Fcap. 8vo, cloth, 1s. 6d.

THE CLERK OF WORKS.

A Vade Mecum for all engaged in the Superintendence of Building Operations.

BY

G. G. HOSKINS, F.R.I.B.A.

Fcap. 8vo, cloth, 1s. 6d.

THE BUILDER'S CLERK.

A GUIDE TO THE MANAGEMENT OF A BUILDER'S BUSINESS.

BY

THOMAS BALES.

E. & F. N. SPON, 125 Strand, London.

New York: SPON & CHAMBERLAIN, 12 Cortlandt Street.

MEMORANDA

OF

BUILDERS' PRICES.

PRICES IN THE YEARS 1703 AND 1876.

		1703.			1876.		
		£	s.	d.	£	s.	d.
Brickwork	per rod ..	5	10	0	15	0	0
Weather boarding	per square	0	13	0	1	10	0
Plain tiling, including laths, &c.	„	1	10	0	2	15	0
Lath and plaster ceilings,	per yard .	0	0	6	0	1	11
Sheet lead on roofs	per cwt...	0	16	0	1	12	0
Lead quarries		0	0	6	0	1	6

N.B.—As the prices of materials are constantly varying, it will be prudent to get special quotations for large contracts.

EXCAVATOR.

PRICES PER CUBIC YARD.

	s.	d.
Digging surface 12 in. deep	0	7½
Digging in common soils and throwing out, not exceeding 6 ft. in depth	0	10
Digging in gravel or stiff clay	0	11
Ditto in common soils, above 6 ft. in depth	1	1
Ditto in gravel or stiff clay, ditto	1	2
Cutting and shearing rock	3	3
Filling into barrows and wheeling, for first run of 20 yards .. .. add	0	4
Wheeling, for every additional run of 20 yards .. .. add	0	3
Basketing out ground .. .. „	0	9
Filling into carts and carting, not exceeding one mile „	3	3
Carting, for every additional mile .. .. „	1	0
Filling in, and ramming to the walls, as the works proceed .. .. add	0	6
Clay, tempered and laid 6 in. deep and puddled per sup. yard	3	3

	s.	d.
Levelling and ramming trenches for concrete per yard sup.	0	1½
Filling in ditto with brickbats, and ramming per yard sup.	0	3½
Dressing and soiling slopes of embankments and cuttings .. .. per sup. yard	0	4
Forming bank and ditches .. .. .. per yard run	0	8

Excavators' Memoranda. See page 35.

Wells.

Wells dug and steened, including tackle, baskets, and stages, not exceeding 30 feet deep, per foot in depth.

	Diameter of Digging. ft.	in.	Diameter in Clear of Brickwork. ft.	in.	Gallons in each Foot in Depth. gals.	Price per Foot in Depth. £	s.	d.
Half Brick thick.	3	6	2	9	39	0	4	6
	4	6	3	9	68	0	5	6
	5	3	4	6	96	0	6	9
	5	9	5	0	120	0	8	3
	6	3	5	6	145	0	10	6
One Brick thick.	7	6	6	0	174	0	14	0
	8	0	6	6	204	0	15	9
	8	6	7	0	236	0	17	6
	9	0	7	6	270	1	1	0
	9	6	8	0	308	1	4	0
	10	0	8	6	348	1	6	0
	10	6	9	0	390	1	8	0
	11	0	9	6	434	1	11	0
	11	6	10	0	481	1	15	0
	12	0	10	6	530	2	0	0
	12	6	11	0	582	2	3	0
	13	0	11	6	637	2	7	0

Where it is requisite to have curbs or pumps, with the labour to the same, they must be charged extra, according to value; extra price if quicksands or rocks occur.

Le Grand & Sutcliff's Artesian Bored Tube Wells.

Le Grand and Sutcliff, Bunhill Row, E.C.

Average prices for boring in alluvial and other free boring strata, exclusive of tubes or other materials, and including all labour.

Boring not exceeding	100	ft.	from	surface	..	7*s.*	to	14*s.*	per ft.
„	„	200	„	„	..	12*s.*	„	24*s.*	„
„	„	300	„	„	..	16*s.*	„	30*s.*	„
„	„	400	„	„	..	20*s.*	„	40*s.*	„
„	„	500	„	„	..	30*s.*	„	50*s.*	„

According to size of boring and nature of strata.

Boring in blowing sands, rock, and other hard or difficult strata:—

Not exceeding	100	ft.	from	surface	..	15*s.*	to	50*s.*	per ft.
„	200	„	„		..	20*s.*	„	60*s.*	„
„	300	„	„		..	25*s.*	„	70*s.*	„
„	400	„	„		..	30*s.*	„	80*s.*	„
„	500	„	„		..	35*s.*	„	90*s.*	„

According to size of boring and nature of strata.

Boring Tubes.

Le Grand and Sutcliff, Bunhill Row, E.C.

Prices.

3	inch	internal	diam.,	¼	in.	thick ..	4*s.* per ft.
4	„	„		„	„	..	5*s.* „
5	„	„		„	„	..	6*s.* „
6	„	„		5/16	in. „	..	9*s.* „
7½	„	„		„	„	..	11*s.* „
8½	„	„		„	„	..	15*s.* „
10	„	„		„	„	..	18*s.* „
11½	„	„		⅜	in. „	..	23*s.* „
13	„	„		„	„	..	27*s.* „
14½	„	„		„	„	..	31*s.* „

These tubes are the best steel, with sockets screwed to butt, and slightly set in at the joints to give increased thickness and strength at the joint, which by this means is made nearly flush with the outside of tubes.

Norton's Patent "Abyssinian" Tube Wells.

Le Grand and Sutcliff, Bunhill Row, E.C.

Prices.

Where driving plant is provided, and a well-driver sent to superintend fixing, and labour provided by customer.

	1¼ in. Internal Diameter without Pump.	2 in. Internal Diameter without Pump.	3 in. Internal Diameter without Pump.	4 in. Internal Diameter without Pump.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
12 ft. deep	2 0 0	3 6 0	7 10 0	9 15 0
Additional depth per ft.	0 2 10	0 4 6	0 10 0	0 13 0

Miscellaneous Articles.

Stoneware. Prices, less discount, at Warehouse.

	£	s.	d.
Yard gully, with funnel, top, and trap, 4-in. outlet each	0	4	4
Water-closet pans .. .. „	0	5	6
„ „ with traps .. .. each 4*s.* to	0	7	6
Traps .. .. „	0	2	6
Gully traps for streets .. .. 9 in., 7*s.* 6*d.*; 12 in., 14*s.*			
„ „ .. .. 15 in., 20*s.*; 18 in., 25*s.*			

	9 in.	10 in.	12 in.	
Flue-pipe, socket joints	1*s.* 2*d.*	1*s.* 6*d.*	1*s.* 10*d.*	per foot
„ butt joints	1*s.* 1*d.*	1*s.* 5*d.*	1*s.* 8*d.*	„

Drains.

Glazed Stoneware Tubular Pipes, with Socket-joints. (Prime cost of pipes).

	Prices per Foot Run.											
	3-in.		4-in.		6-in.		9-in.		12-in.		15-in.		18-in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Straight pipes, each, 2 feet lengths ..	0	3	0	4	0	5	0	9	1	3	2	2	3	4
Bends, ditto ..	0	8	0	10	1	0	1	9	2	9	5	6	9	0
Single junctions, ditto ..	0	9	1	0	1	4	2	4	3	8	7	4	12	0
Double junctions, ditto ..	1	1½	1	6	2	0	3	6	5	6	11	0	18	0
Syphons, each (extra inlet, 6d. each) ..	—		1	0	1	9	5	0	7	6	12	6	18	9
Gully traps, each	1	3	2	0	2	6	3	9	6	0	—		—	
Drain mouth, with galvanized iron flap, each	—		2	0	2	6	3	9	6	0	15	9	30	0

The above are London District prices. Midland District 10 per cent. less.

Barrel Drains.

(Price exclusive of digging.)

	Per Foot Run.			
	In Mortar.		In Cement.	
	s.	d.	s.	d.
9-in. barrel drain, ½-brick rim	1	7	2	1
12-in. „ „	1	11	2	4
15-in. „ „	2	3	2	10
18-in. „ „	2	9	3	5
15-in. „ 1-brick rim	5	3	6	9
18-in. „ „	5	9	7	6
24-in. „ „	6	9	8	6
30-in. „ „	8	9	11	0
Render inside ditto, per ft. sup.	..		0	3
Small drains, 2 courses high, with pantile bottom and brick flat top	per foot run. 0	11	1	2
Ditto, 9 in. wide, 3 courses high, paved bottom and arched top	1	6	2	0
Ditto ditto, 12 in. wide and 4 courses high	2	0	2	5

Example of London Vestry Rates.

St. George's, Hanover Square.

The parish connects drain with sewer, inserting flap-trap and two lengths of pipe at the following rates:—

	s.	d.
6 in.	15	0
9 in.	19	0
12 in.	26	0

The builder digs and fills in.

St. John, Hampstead.

	s.	d.
Roads—		
Gravel at per yard superficial	1	3
Macadam „ „	1	9
Granite paving „ „	2	0
Do. on concrete „ „	4	0
Footway—		
Pebble „ „	1	0
York relaid „ „	1	6
York new and laying at per yard superficial	9	0
Kerb relaid per foot run	0	2
Tar paving per yard superficial	5	6
Asphalte	8	6

Mason.

	s.	d.
Providing, laying, and fixing Yorkshire paving and landings, tooled and squared, 2 in. thick, per foot super...	0	10
Do. do. 2½ in. „ „	0	11
Do. do. 3 in. „ „	1	9
Do. do. 4 in. „ „	1	4

CONCRETE.

	£	s.	d.
Concrete in foundations, composed of 1 of ground stone lime and 6 of gravel or ballast and sand, per cubic yard, from 8s. 6d. to	0	10	6
Ditto ditto under floors, 6 in. thick, per sup. yard	0	1	10
Concrete in foundations, composed of 1 of Portland cement and 7 of Thames ballast, per cubic yard, from 14s. to	0	16	0
Concrete, with Portland cement, in walls 9 in. thick, per sup. yard, exclusive of boarded casing	0	4	3
Ditto ditto, per rod	9	10	0

Example of Cost, by Leaning.

The value of concrete depends upon—first, the amount of void in the aggregate which needs to be filled with the matrix; second, the diminution in bulk of the lime and sand, or cement and sand, as a result of mixing with water.

Stone broken into 2½ in. cubes has voids			37	per cent.
„ „	2 in.	„ „	40	„
„ „	1½ in.	„ „	42	„
Clean shingle or burnt clay		„	33	„
Thames ballast		„	15	„

The diminution of sand and lime when made into mortar (matrix), is generally about one-fourth, more or less, and this may be adopted as a reasonable average. For cement and sand one-sixth may be taken as the average.

We may apply these facts to the calculation of the value of concrete in the following manner:

Taking water supplied in London by meter as 1s. per 1000 gallons, we have less than ¼d. for a yard of concrete. Some water companies charge 1d. per yard of concrete; this is a reasonable average cost. Constant for mixing only, ·125 per cubic yard.

Example 1. Concrete composed of one part ground stone lime to six parts Thames ballast.

	£	s.	d.
6 yards of ballast (one-third sand) 4s. 6d.	1	7	0
25 per cent. on 9s. for diminution of 2 yards of sand in last	0	2	3
1 yard lime	0	11	0
Diminution of lime 25 per cent.			
Voids in ballast 15 „			
Total 40 „ on 11s.	0	4	4¾
7)	2	4	7¾
	0	6	4¾
Labour mixing (labourer 8 yards per day at 5¾d. per hour = per yard)	0	0	7¼
25 gallons water	0	0	1
Cost of 1 yard	0	7	0¾

Example 2. Concrete composed of one part Portland cement to six of Thames ballast; the cement 112 lb. per bushel.

	£	s.	d.
6 yards of ballast, as before, at 4s. 6d.	1	7	0
16¾ per cent. ⅙th on 9s. for diminution of 2 yards of sand in last	0	1	6
21 bushels (21 cwt.) of cement at 35s. per ton	1	16	9
Diminution of cement 16¾ per cent.			
Voids in ballast 15 „			
31¾ „			
say 32 on 36s. 9d.	0	11	9
7)	3	17	0
	0	11	0
Labour mixing as last	0	0	7¼
Water as last	0	0	1
	0	11	8¼

The following prices have been quoted for hollow concrete blocks, 2 ft. long, 1 ft. wide, and 9 in. high, with V or joggle joints run with

cement. It is said a bricklayer can lay 50 blocks per day, and that the blocks are nearly non-absorbent.

COMPARATIVE COST OF WALLING PER CUBIC FOOT.

Plain-faced Masonry.	Plain-faced Brickwork.	Plain-faced Concrete Block.
2*s.* 9*d.*	1*s.* 0*d.*	0*s.* 9*d.*
Moulded Masonry.	Moulded Brickwork.	Moulded Concrete Block.
4*s.* 6*d.*	1*s.* 3*d.*	1*s.* 0*d.*

Ornamental patterns have been produced in concrete blocks, cast in a wooden or iron mould, and at very low price, but a reliable price cannot as yet be given. Colours can also be given to the blocks by mixing stains with the cement.

Concrete made with gravel would be disintegrated by great heat, and is most liable to fractures. Concrete made with burnt clay, pounded shingle, slag, clinkers, &c., is the strongest.

By grinding a stone, and mixing with cement for a face, a concrete block can be produced to resemble the stone. For ornamental work, such as a pierced parapet, a great saving in cost can be made by this means, and the appearance of stonework retained.

Cottage and farm buildings can, it is said, be built in concrete for 20 per cent. less than brick.

Lascelles' patent consists of concrete slabs, 2 ft. × 3 ft., and 1 in. thick; the face side being cast in a mould to resemble tiles. The weight of a slab is about 50 lbs., and costs from 2*d.* to 3*d.* per foot superficial. The slabs are secured with wood screws to wood studs, 3½ in. × 2½ in., and 3 ft. apart. The slabs are rebated, and the joints filled in with mortar. No foundations are required, only a plate about 6 in. × 2 in. on a cement bed about 9 in. × 9 in.

A pair of cottages, on the Scotch "butt and ben" plan, containing living room, with beds in recesses, bed room, loft over, scullery, pantry, &c., cost for materials, all prepared and delivered on the Thames, 150*l.* the pair; or, fixed, about 200*l.*

Fish scale tile slabs 2 ft. × 3 ft., and 1¼ in. thick	12*l.* 10*s.* per 100 or about 5*d.* per ft. super.
Plain slabs, ditto, ditto	10*l.* per 100, or about 4*d.* per ft. super.
Lining slabs, 2 ft. × 3 ft., and 1 in.	8*l.* 15*s.* per 100, or about 3½*d.* per ft. super.
Studs faced three sides, 8 ft. long, 4 in. × 4 in.	11*l.* 15*s.* per 100, or about 3½*d.* per ft. run.

Marr and Black's Concrete.

Concrete flooring 100 yards and upwards—

Laid in Bradford		3s. 3d. per yd. super.
" Leeds, Halifax, &c.		3d. " addl.
" Manchester, York, Sheffield, &c.		6d. " "
" Liverpool, Nottingham, &c.		9d. " "
" South of London		1s. 8d. " "
" London		4s. 7d. to 5s. per yard super.
Grooved for stables		3d. " extra.
Granite faced		3d. " "
Concrete sinks		1s. 2d. per ft. super.
" ridges		2s. 6d. per yd. run.
" garden edges		2s. "
" chimney-pieces		from 7s. 6d. each.

Wilkinson's (Newcastle-on-Tyne) Granite Concrete Foot-pavement, laid complete in London, 4s. 6d. per yard.

Stable pavement, 5s. Extra strong ditto, 7s.

Aireside Special Slag Concrete.

Window Sills, 11½ in. × 7 in.	from 1s. 8d. per linl. ft.
" Heads, 14 in. × 4½ in.	" 1s. 8d. "
Door Steps, 12 in. × 8 in.	" 1s. 8d. "
Treads, 3 ft. × 12 in. × 2½ in.	" 8d. "
Risers, 3 ft. × 5½ in. × 2 in.	" 4d. "
Winding Steps, 8 in. thick	" 1s. 8d. per super. ft.
Round Ridging, for roofs	" 2s. 3d. per linl. yd.
Plain " "	" 1s. 10d. "
Knee Stones	" 5s. each.
Tabling, 12 in. × 3 in.	" 9d. per linl. ft.
Large Corbels	" 5s. per dozen.
Small "	" 3s. "
Stringing Course, 5½ in. × 3 in.	6d. per linl. ft.
" " 5½ in. × 2 in.	4d. "
Octagon Coping, 11½ in. × 6 in.	1s. "
" " tees	3s. 6d. each.
" " elbows	3s. "
Garden Edging	1s. per yard.
" " square or round corners	1s. 3d. each.
Landings, 8 in. thick	from 1s. 10d. per sup. ft.
Sinks, 6 in. thick	" 1s. 4d. "
Kitchen Fireplaces, 4 ft. × 4 ft., with mantels, 5 ft. 6 in. × 11 in. × 3½ in., and jambs, 4 ft. × 9 in. × 3½ in.	10s. 6d. each.

The Aireside Hematite Iron Co.'s specially prepared Slag for all classes of Concrete, prices free in carts or trucks:—

To pass through ¾ in. screen	6s. per ton.
" " ½ in. "	5s. 6d. "
" " ⅜ in. "	5s. "
" " ¼ in. "	4s. 6d. "
" " 1 in. "	3s. 6d. "
" " 1 in. " Nuts	3s. "
2½ in. to 2½ in. Machine Broken, for Foundations and Fire-proof Floors	2s. 6d. "

Granitic Stone Paving.

"Granitic" Paving laid "in situ."

2-inch Granitic Paving, with plain surface ..	4*s.* per yd. super.
1½ „ „ „ „ „ „ ..	3*s.* 6*d.* „
3-inch „ grooved and channelled complete	5*s.* 6*d.* „

For Stables, Driving Yards, etc.

"Spandril Steps" built "in situ."

Plain	per ft. run, from 2*s.* 6*d.*
Nosed	„ „ „ 3*s.*

The above Paving is laid in one solid layer, and requires a foundation of dry broken brick, 4 in. thick which is not included in the above price.

Granitic Stone.

Prices at Works.

2-in. "Granitic" Paving Flags.	Usual stock size	per ft. super.	6*d.*
Gate Stones.	4 ft. 6 in. × 2 ft. × 3 in.	„	7*d.*
„	4 ft. × 2 ft. × 3 in.	„	7*d.*
„	4 ft. × 2 ft. × 2 in.	„	6*d.*
Steps.	Square, 12 in. × 3 in.	per ft. run	8*d.*
„	„ 12 in. × 2 in.	„	7*d.*
„	Round nosed, 12 in. × 3 in.	„	1*s.*
„	„ 12 in. × 2 in.	„	10*d.*
Risers.	5 in. × 2 in.	„	4½*d.*
Coping.	12 in. × 3 in.	„	8*d.*
„	12 in. × 2 in.	„	7*d.*
Window Sills.	9 in. × 3 in.	„	8*d.*
Coal Plate Stones.	Each	.. ..	2*s.* 3*d.*
Manhole Frames and Oval Iron Covers.	Each complete ..		20*s.*

STATEMENT OF COMPARATIVE COST OF MORTARS.—Redgrave.

Description.	Proportions in Cube Yards.				Cost of Materials.	Cost of Labour and Water.	Total Cost.	Produce of Mortar in Cube Yards.	Cost per Cube Yard.
	Portland Cement at 45s. 8d. per Cube Yard.	Grey Lime at 14s. 6d. per Cube Yard.	Loam at 2s. 9d. per Cube Yard.	Sand at 2s. 9d. per Cube Yard.	s.	s.	s.	c. yds.	s.
Grey lime mortar..	..	1·00	..	2·00	20·00	6·62	26·62	2·25	11·83
Portland cement mortar:									
No. 1	1·00	..	..	6·00	62·19	6·84	68·23	5·90	11·56
No. 2	1·00	..	..	8·00	67·69	7·80	75·49	7·60	9·93
No. 3	1·00	..	..	10·00	73·19	9·57	82·76	9·30	8·88
Portland cement and lime mortar:									
No. 1	1·00	0·50	..	6·00	69·44	8·68	78·12	6·40	12·20
No. 2	1·00	0·66	..	8·00	77·27	11·20	88·46	8·25	10·72
No. 3	1·00	0·83	..	10·00	85·22	13·78	99·00	10·15	9·75
Portland cement and loam mortar:									
No. 1	1·00	..	0·50	6·00	63·56	6·23	69·79	6·10	11·44
No. 2	1·00	..	0·66	8·00	69·53	8·05	77·58	7·90	9·82
No. 3	1·00	..	0·83	10·00	75·47	9·97	85·44	9·65	8·76

BRICKLAYER.

(Memoranda of Bricklayers' Work. See page 12.)

TABLE SHOWING THE VALUE OF BRICKWORK PER ROD, ACCORDING TO THE PRICE OF BRICKS, &c.

Price of Bricks per Thousand.	Cost of Labour and Mortar per Rod.																					
	70s.			75s.			80s.			85s.			90s.			95s.			100s.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
21	8	9	0	8	14	0	8	19	0	9	4	0	9	9	0	9	14	0	9	19	0
22	8	15	0	8	18	0	9	3	0	9	8	0	9	13	0	9	18	0	10	3	0
23	8	18	0	9	3	0	9	8	0	9	13	0	9	18	0	10	3	0	10	8	0
24	9	2	0	9	7	0	9	12	0	9	17	0	10	2	0	10	7	0	10	12	0
25	9	7	0	9	12	0	9	17	0	10	2	0	10	7	0	10	12	0	10	17	0
26	9	11	0	9	16	0	10	1	0	10	6	0	10	11	0	10	16	0	11	1	0
27	9	16	0	10	1	0	10	6	0	10	11	0	10	16	0	11	1	0	11	6	0
28	10	0	0	10	5	0	10	10	0	10	15	0	11	0	0	11	5	0	11	10	0
29	10	5	0	10	10	0	10	15	0	11	0	0	11	5	0	11	10	0	11	15	0
30	10	9	0	10	14	0	10	19	0	11	4	0	11	9	0	11	14	0	11	19	0
31	10	14	0	10	19	0	11	4	0	11	9	0	11	14	0	11	19	0	12	4	0
32	10	18	0	11	3	0	11	8	0	11	13	0	11	18	0	12	3	0	12	8	0
33	11	3	0	11	8	0	11	13	0	11	18	0	12	3	0	12	8	0	12	13	0
34	11	7	0	11	12	0	11	17	0	12	2	0	12	7	0	12	12	0	12	17	0
35	11	12	0	11	17	0	12	2	0	12	7	0	12	12	0	12	17	0	13	2	0
36	11	16	0	12	1	0	12	6	0	12	11	0	12	16	0	13	1	0	13	6	0
37	12	1	0	12	6	0	12	11	0	12	16	0	13	1	0	13	6	0	13	11	0
38	12	5	0	12	10	0	12	15	0	13	0	0	13	5	0	13	10	0	13	15	0
39	12	10	0	12	15	0	13	0	0	13	5	0	13	10	0	13	15	0	14	0	0
40	12	14	0	13	0	0	13	5	0	13	10	0	13	15	0	14	0	0	14	5	0
41	12	19	0	13	5	0	13	10	0	13	15	0	14	0	0	14	5	0	14	10	0
42	13	3	0	13	10	0	13	15	0	14	0	0	14	5	0	14	10	0	14	15	0
43	13	8	0	13	15	0	14	0	0	14	5	0	14	10	0	14	15	0	15	0	0
44	13	12	0	14	0	0	14	5	0	14	10	0	14	15	0	15	0	0	15	5	0
45	13	17	0	14	5	0	14	10	0	14	15	0	15	0	0	15	5	0	15	10	0
46	14	2	0	14	10	0	14	15	0	15	0	0	15	5	0	15	10	0	15	15	0
47	14	6	0	14	15	0	15	0	0	15	5	0	15	10	0	15	15	0	16	0	0
48	14	11	0	15	0	0	15	5	0	15	10	0	15	15	0	16	0	0	16	5	0
50	14	15	0	15	0	0	15	5	0	15	10	0	15	15	0	16	0	0	16	5	0

A TABLE SHOWING THE VALUE PER FOOT OF REDUCED BRICKWORK, FROM £1 2s. 8d. TO £17 PER ROD.

Per Foot.	Per Rod.			Per Foot.	Per Rod.		
d.	£	s.	d.	d.	£	s.	d.
1	1	2	8	8¼	9	7	0
¼	1	8	4	½	9	12	8
½	1	14	0	¾	9	18	4
¾	1	19	8				
				9	10	4	0
2	2	5	4	¼	10	9	8
¼	2	11	0	½	10	15	4
½	2	16	8	¾	11	1	0
¾	3	2	4				
				10	11	6	8
3	3	8	0	¼	11	12	4
¼	3	13	8	½	11	18	0
½	3	19	4	¾	12	3	8
¾	4	5	0				
				11	12	9	4
4	4	10	8	¼	12	15	6
¼	4	16	4	½	13	0	8
½	5	2	0	¾	13	6	4
¾	5	7	8				
				12	13	12	0
5	5	13	4	¼	13	17	8
¼	5	19	0	½	14	3	4
½	6	4	8	¾	14	9	0
¾	6	10	4				
				13	14	14	8
6	6	16	0	¼	15	0	4
¼	7	1	8	½	15	6	0
½	7	7	4	¾	15	11	8
¾	7	13	0				
				14	15	17	4
7	7	18	0	¼	16	3	0
¼	8	4	4	½	16	8	8
½	8	10	0	¾	16	14	4
¾	8	15	8				
				15	17	0	0
8	9	1	4				

A TABLE SHOWING THE VALUE FROM 1 TO 272 FEET OF REDUCED BRICKWORK, FROM £8 TO £16 PER ROD.

Feet.	At £8.			At £10.			At £12.			At £14.			At £16.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	0	0	7	0	0	8½	0	0	10½	0	1	0½	0	1	2
2	0	1	2	0	1	5½	0	1	9	0	2	0½	0	2	3½
3	0	1	9	0	2	2½	0	2	7½	0	3	1	0	3	6½
4	0	2	4	0	2	11	0	3	6	0	4	1½	0	4	8½
5	0	2	11	0	3	8	0	4	5	0	5	1½	0	5	10½
6	0	3	6½	0	4	5	0	5	3½	0	6	2	0	7	0½
7	0	4	1½	0	5	1½	0	6	2	0	7	2½	0	8	3
8	0	4	8½	0	5	10½	0	7	0½	0	8	2½	0	9	5
9	0	5	3½	0	6	7½	0	7	11½	0	9	3½	0	10	7½
10	0	5	10½	0	7	4	0	8	9½	0	10	3½	0	11	9
15	0	8	9½	0	11	0½	0	13	2½	0	15	5½	0	18	7½
20	0	11	9	0	14	8½	0	17	7½	1	0	7	1	3	6½
25	0	14	8½	0	18	4½	1	0	0½	1	5	8½	1	10	9
30	0	18	4½	1	2	0½	1	6	5½	1	10	10½	1	15	3½
40	1	2	0½	1	9	5	1	5	3½	2	1	2	2	7	0½
50	1	9	5	1	16	9	2	4	1½	2	11	5½	2	16	9½
60	1	15	3½	2	4	1½	2	12	11½	3	1	9½	3	10	7
70	2	1	2	2	11	5½	3	1	9	3	12	0½	4	2	4½
80	2	7	0½	2	18	9½	3	10	7	4	2	4½	4	13	1½
90	2	12	11½	3	6	2	3	19	5	4	12	7½	5	6	10½
100	2	18	9½	3	13	6½	4	8	2	5	2	11½	5	17	8½
110	3	4	8½	4	0	10½	4	17	0½	5	13	2½	6	9	5
120	3	10	7	4	8	2½	5	5	10½	6	3	6½	7	1	2
130	3	16	5½	4	15	7	5	14	8½	6	13	9½	7	12	11
140	4	2	4	5	2	11½	6	3	6½	7	4	1½	8	4	8½
150	4	8	2½	5	10	3½	6	12	4	7	14	4½	8	16	5½
160	4	14	1½	5	17	7½	7	1	2	8	4	8½	9	8	2½
170	5	0	0	6	5	0	7	10	0	8	15	0	10	0	0
180	5	5	10½	6	12	4	7	18	9½	9	5	3½	10	11	8½
190	5	11	9	6	19	8	8	7	7½	9	15	7	11	3	6½
200	5	17	7½	7	7	0½	8	16	5½	10	5	10½	11	15	3½
210	6	3	6½	7	14	5	9	5	3½	10	16	2	12	7	0½
220	6	9	4½	8	1	9	9	14	1½	11	6	5½	12	18	9½
230	6	15	3½	8	9	1½	10	2	11½	11	16	9	13	10	6½
240	7	1	2	8	16	5½	10	11	9	12	7	0½	14	2	4
250	7	7	0½	9	3	9½	11	0	7	12	17	4	14	14	1
260	7	12	11	9	11	2	11	9	5	13	7	7½	15	5	10½
270	7	18	10	9	18	6	11	18	3	13	17	11½	15	17	7½
272	8	0	0	10	0	0	12	0	0	14	0	0	16	0	0

Arches (*Rough*).

Set in mortar for pointing. (Measure face and soffit.)

	Per Ft. Super.		
	£	s.	d.
Rough axed	0	0	7½
Half brick trimmer arches in cement	0	0	7
One „ cellar „ „	0	0	10
One and half brick cellar arches in cement..	0	1	3
Semi or Camber, axed (S.B.)	0	0	11
Gothic or Venetian, axed (S.B.)	0	1	7
If of second malms	0	1	9
White joint pointing, add	0	0	4
Tuck pointing „	0	0	6
If circular on plan „	0	1	2

Arches (*Gauged*).

	Per Foot Superficial.					
	All Materials and Labour.			Labour and Mortar.		
	£	s.	d.	£	s.	d.
Semi or Camber, with best malms or red bricks, set in putty ..	0	2	9	0	1	8
Ditto, elliptical or Tudor	0	3	6	0	2	0
Ditto, circular on plan	0	5	6		—	
Semi, upright of niches in best malms or red bricks	0	5	6		—	
Heads of ditto	0	10	0		—	

Brickwork in Mortar.

	Per Rod Reduced.	
	All Materials and Labour.	Labour and Mortar.
	£ s. d.	£ s. d.
Brickwork laid dry in wells ..	11 5 0	2 8 6
„ (all stocks) in mortar in walls	14 5 0	5 5 0
„ picked for outside work and jointed ..	15 15 0	5 10 0
„ in walls, picked stocks and jointed both sides	16 0 0	5 15 0
If done with blue lias lime add ..	0 10 0	—
„ Portland cement add	2 10 0	—

Each face measured.

	Per Ft. Super.
	All Materials and Labour.
	£ s. d.
Circular work, flat sweep, add	0 0 1½
„ quick „ „	0 0 1⅝
	per rod.
Pulling down, cleaning, and stacking only ..	1 10 0
	per ft. cube.
Ovens, coppers, and other solid work	0 1 2

Brick Nogging.

The quarters to be measured in.

	Per Yard Superficial.	
	In Mortar.	In Cement.
	£ s. d.	£ s. d.
Place bricks, on edge	0 2 3	0 2 10
„ flat	0 3 2	0 3 10
Stock bricks, on edge	0 2 9	0 3 4
„ flat	0 3 9	0 4 6

Facings.

In addition to the price of stock bricks.

	Per Ft. Super. £	s.	d.
Picked stocks	0	0	1½
Second malms	0	0	4
Best „	0	0	4½
Red bricks	0	0	4
Suffolk white	0	0	5½

For facings add 1*d.* for every 10*s.* difference in value between hidden bricks and facings.

Sundries.

	All Materials. s.	d.
Cutting to rakes, per foot super.	0	2½
	per foot run.	
Fair Squint quoins, per foot run	0	4½
„ Bird's Mouth, „	0	4½
„ Splays, „	0	4
4-in. chase or indent, cut and pargetted ..	0	4
Points to groins of common stocks	0	8
„ malms	0	11
Double plain tile creasing in mortar	0	4
„ „ cement	0	5
Lime and hair filleting in mortar	0	2
„ „ cement	0	2½
Making good to window sills, each	1	4
Hoop-iron bond tarred and sanded and laid in walls—	per yard run.	
No. 16, 1½ inch wide, for every strip ..	0	2½
„ 15, 1¾ „ „ ..	0	2½
Tyreman's patent (notched)—		
No. 16, 1½ inch wide, „ ..	0	2½
„ 15, 1¾ „ „ ..	0	2½

Patent porous fireproof bricks and fixing blocks, 60*s.* per 1000 on wharf at London.

Pointing.

	Per Foot Superficial.					
				In Cement.		
	£	s.	d.	£	s.	d.
Flat joint, in blue ash mortar ..	0	0	3	0	0	3½
„ to chimney shafts ..	0	0	4	0	0	4½
Tuck pointing	0	0	3½		—	
White joint pointing	0	0	2½	0	0	3½
If scaffolding has to be erected, add	0	0	1½		—	
Tuck pointing to old fronts, including scaffolding, raking out joints, washing and staining brickwork	0	0	6		—	
Brickwork cleaned, coloured, and drawn	0	0	2		—	

Brickwork in Roman Cement.

Equal parts of cement and sand.

	All Materials.			Labour and Cement.		
	£	s.	d.	£	s.	d.
All stocks per rod reduced ..	17	0	0	7	12	0
Half-brick walls, per foot super.	0	0	5½	0	0	3
„ trimmers, „	0	0	6½		—	
One brick on edge, per foot run	0	0	5	0	0	3
1½ „ „ „	0	0	7	0	0	3½
12-inch tile coping, „	0	0	7½		—	
10 „ „ „	0	0	6½		—	
Rendering in cement from the trowel	0	0	2		—	

Paving.

	Per Yard Superficial.		
	In Sand.	In Mortar.	In Cement.
	s. *d.*	*s.* *d.*	*s.* *d.*
Common stock bricks, flat ..	2 3	2 9	3 4
„ „ on edge	3 4	3 10	4 6
Malm paviors, flat..	3 6	4 3	5 0
„ on edge	4 10	5 8	6 5
Paving bricks, flat..	3 4	4 3	5 0
„ on edge	5 0	5 9	6 6
„ herring-bone, add	0 5	0 5	0 5
10-inch tiles	—	4 9	5 9
12 „ „	—	5 3	6 3
If rubbed and faced to close joint .. .. add	—	2 0	2 0
Dutch clinkers	10 0	10 9	11 9
„ laid herring-bone	11 0	11 9	12 9

Encaustic Tiles.

A solid bottom of fine concrete and cement should be prepared for tiles, leaving of an inch for tiles ½ in. thick, and ¾ of an inch for tiles ¾ in. thick.

	Per Yard Super.
	s. *d.*
Tile pavement laid complete—	
Red, buff, black, and white	14 3
Buff and black ditto	11 10
Buff octagon, black, red, and white ditto	15 4
Red and buff ditto	12 4
Red, with glazed black bands.. about	19 0

Country prices about 2*s.* per yard extra.

Tiles only.

	s. *d.*
Red, black, chocolate, grey, ½ in. thick per yd.	5 6
Ditto, ¾ in. thick .. .. „	8 6
Ditto, with buff, cream, or fawn, ¾ in. thick „	7 6
Tesseræ, 1 in. × 1 in. to ¼ in. × ¾ in. extra	4 0
White glazed wall tiles, 6 in. × 6 in. per 100	23 0
Ditto, fixed .. .. per yard	13 9
Glazed hearth tiles .. .. „	24*s.* to 50*s.*
Modelling new designs for tiles, 6 in. × 6 in. per mould	15 0

French Tiles.

Glazed—suitable for Walls.

	Francs.
Aubagne (near Marseilles), blue and white ornamental, 6 in. × 6 in. .. per 100	15
Ditto, diaper .. .. „	13
Calais, blue and white, 4¼ in. × 4¼ in. .. „	12
„ French blue, 5 in. × 5 in. .. .. „	13
„ white, 6 in. × 6 in. .. .. .. „	15
„ dull red, 6 in. × 6 in. .. .. .. „	3
„ brown, red, yellow, and green, 9¼ in. × 9¼ in. .. .. .. „	16
Naples, blue and white Persian pattern, per mètre super.	16 to 20

Mosaics.

	Per Foot Sup. s.	d.
Plain white	2	6
„ with black rings and border ..	3	0
„ with leaf in black, and border ..	4	0
„ with black lines in squares, and leaf in centre, and border	5	0

Chimney Pots, and Setting in Cement.

	s.	d.
Large size	6	3
Second „	5	3
Third „	4	3
24-inch compo	5	0
18 „ „	4	0
Terra-cotta pots, from 5s. to 10s.		
Ornamental Gothic pots, £3 to £5.		

Bennison's Patent Flue Base (or Receiver).

In Fire Clay.

	s.	d.
For 9 in. × 9 in. Flue, or circular 8 in. bore	10	6
„ 9 in. × 14 in. „ „	12	6

Day Work.

	s.	d.
Bricklayer .. .. per hour	0	11½
Labourer .. .. „	0	8
Fire Bricklayer, range and furnace work .. .. „	1	1
Fire Labourer „ „ .. .. „	0	9
Scaffolder .. .. „	0	8½
(Country jobs: lodgings and expenses extra, per day. Travelling expenses extra.)		
Carting bricks, including loading and unloading, first mile, per 1000..	5	0
Each mile beyond	1	6
Carting rubbish, one mile, single load, including shoot	4	3
Place Bricks .. .. per 100	4	0
Grey stocks .. .. „	4	6
Red „ .. .. „	6	0
Second malms .. .. „	8	6
Cutters .. .. „	11	0
Red rubbers .. .. „	8	0
Coping, 9 in. .. .. „	8	0
Paving bricks .. .. „	8	0
Dutch clinkers .. .. „	5	6
Adamantine clinkers .. .. „	6	0
Terro-metallic „ .. .. „	6	6
Grooved paviors, 4 × 4 × 2½ .. .. „	9	0
„ 9 × 3 × 3½ .. .. „	14	6
Air bricks, 9 × 2½ .. .. „	30	0
Windsor fire-bricks.. .. .. „	12	0
Stourbridge „ .. .. „	12	6
Newcastle „ .. .. „	12	0
Chalk lime by the yard or hundred	11	0
„ per bushel	0	10
Stone lime by the hundred	13	0
„ per bushel	1	0
Blue lias, per ton	24	0
	P.C.	
Cement, Portland, per bushel 1 10	2	6
„ Roman, „ 1 6	2	0
„ Keen's, „ 2 10	3	7
„ Parian, „ 3 0	4	0
Mortar, per load	19	0
„ per hod	0	7
Lime and hair, per load..	25	0
„ per hod	0	10
Pargetting, „	0	9
Fine stuff, „	1	2
White pointing, „	1	9
Blue or red, „	1	2
Hair, per bushel	1	3
Sand, per cubic yard	7	0
Ballast (Thames) per cubic yard..	7	6
Ashes, per bushel	0	9
Limewhite, per pail	0	6
Coloured ditto „	0	10
4-in. stoneware drain pipes, per foot .. .. including laying	0	7
6 „ „ „ .. .. including laying	0	9
9 „ „ „ .. .. including laying	1	4
12 „ „ „ .. .. including laying	2	9
Sanderson's "Damp Resister," for cure of damp walls, per gall. ..	10	0

Fire Lumps and Tiles.

	Welsh.	Stourbridge.
	s. d.	s. d.
Single bricks	0 2	0 2½
9-in. tiles .. ..each	0 9	1 0
12 „ .. .. „	1 0	1 9
18 „ .. .. „	2 10	4 6
24 „ .. .. „	6 0	8 6
16-in. lumps .. .. „	1 7	3 2
20 „ .. .. „	2 4	4 0
24 „ .. .. „	3 10	5 4
30 „ .. .. „	5 3	7 2
36 „ .. .. „	6 9	9 8

Bricks, Prime Cost at London Depôts.

		s. d.
Moulded Gault Bricks, chamfered, bull-nose, and quadrant	per 1000	78 0
Cavetto—bead, ogee, ovolo and fillet, bird's mouth, saddle back, and label mould	„	82 0
		£ s.
Pether's ornamental bricks for strings and surfaces	„	7 0
„ for arches (special radiated) ..	„	8 0
„ „ columns „ ..	„	8 0
Red, extra	„	0 10
Berkhampstead Red Moulded Brick, at brickyard,		
Splays, &c.	per 100	7 0
Ovolos, &c.	„	8s. to 10s.
Ornamental	„	10s to 15s.
Mullions and Jambs	„	13 0
Moulded Coping	„	20 0
For Ornamental Chimneys..	„	15 0

Cement, Prime Cost at Works.

		s. d.
Portland Cement, No. 1	per ton	36 6
Roman Cement	„	32 0
Lias Cement	„	30 0
Blue Lias Lime, Lump..	„	9 0
Ditto Ground	„	12 0
Dorking Grey Stone Lime, per yard of 36 bushels, at London Depôt..		11 0
Ditto, Ground, in London		11s to 12s.
Selenitic Cement „	per ton	30 0

Prime Cost of Materials,

Exclusive of Carriage and Fixing.

	s.	d.
Air Bricks, in stoneware or terra-cotta.		
9 in. × 3 in. .. .. each	0	4
9 in. × 6 in. .. .. „	0	10
Terra-cotta Flue Pipes, whole sockets, and with sides cut off.		
9 in. bore .. .. per foot	1	2
10 in. „ .. .. „	1	6
12 in. „ .. .. „	1	10
Butt Joints, 9 in. bore .. .. „	1	1
„ „ 10 in. „ .. .. „	1	5
„ „ 12 in. „ .. .. „	1	8
Patent Stoneware Damp-proof Course, made in 9 in. lengths.		
3 in. thick, for 4½ in. wall .. .. per foot run	0	3½
„ „ „ 9 in. „ .. .. „	0	6½
„ „ „ 13½ in. „ .. .. „	0	10½
„ „ „ 18 in. „ .. .. „	1	1½
1½ in. „ „ 4½ in. „ .. .. „	0	2½
„ „ „ 9 in. „ .. .. „	0	4½
„ „ „ 13½ in. „ .. .. „	0	7
„ „ „ 18 in. „ .. .. „	0	9
Stoneware Sinks, white glazed.		
20 in. long × 15 in. wide .. .. each	6	6
24 in. „ × 17 in. „ .. .. „	8	9
30 in. „ × 19 in. „ .. .. „	11	0
36 in. „ × 22 in. „ .. .. „	16	6
42 in. „ × 24 in. „ .. .. „	22	0
Sussex Red Bricks and Terra-cotta, prime cost on trucks at Burgess Hill.		
Red Bricks .. .. per 1000	42	6
„ Rubbers .. .. „	75	0
„ Moulded .. .. „	50/	to 80/
Crested Ridge Tiles, black, red, or white .. .. each	6d.	to 1s.
Terra-cotta, Diaper, 9 × 9 × 3 .. .. „	1	0
„ String, 12 × 9 × 6 .. .. per foot	1	6
„ Copings, 1 ft. 6 in. long, for 9 in. walls .. .. each	2	0

Gault Bricks.

Prime Cost.	s.	d.
Delivered into carts at London Depôts.		
Bricks, No. 1, Pressed Gault (Facing) .. .. per 1000	70	0
„ No. 2 „ „ (Mingled).. .. .. „	63	0
„ No. 3 „ „ (Paviors) .. .. „	65	0
„ No. 1, Wire Cut „ (Facing) .. .. „	65	0
„ No. 2 „ „ (as they rise from Kiln) .. .. „	60	0
„ No. 3 „ „ (Mingled).. .. .. „	55	0
Lime, Great Culand Cliff Hydraulic .. .. per yd.	11	0
„ Grey Stone .. .. „	10	0
„ Chalk Flare .. .. „	10	0
Cement, Portland .. .. per cental	2	0
„ Sheppy .. .. „ bushel	1	6
„ Roman .. .. „ „	1	9
If delivered by Van within a radius of three miles, or to any Railway Station in London, Bricks, 6s. per 1000; Lime, 1s. per yard; Cement, 1d. per bushel extra.		

GAULT BRICKS—*continued.*

	s.	d.
Delivered by Barge-load alongside in the Thames, below Battersea Bridge.		
Bricks, No. 1, Pressed Gault (Facing) .. .. per 1000	66	0
„ No. 2 „ „ (Mingled) .. .. „	60	0
„ No. 3 „ „ (Paviors) .. .. „	63	0
„ No. 1, Wire Cut „ (Facing) .. .. „	60	0
„ No. 2 „ „ (as they rise from Kiln) .. „	55	0
„ No. 3 „ „ (Mingled) .. .. „	50	0
Delivered into carts at London Depôts.		
Burham Cutters .. .. per 1000	84	0
Clinkers .. .. „	28	0
Hollow Tiles, 18 × 9 × 2½ .. .. per 100	34	0
„ „ 14 × 9 × 2½ .. .. „	30	0
Square Tubes, 24 × 4½ × 2½ .. .. „	22	0
„ „ 18 × 4½ × 2½ .. .. „	15	0
„ „ 9 × 4½ × 2½ .. .. per 1000	48	0
Paving Tiles, 12 × 12 × 1½ .. .. per 100	18	0
Sole „ 14 × 5 × ¾ .. .. per 1000	36	0
Cubitt's „ 12 × 7 × ¾ .. .. „	40	0
No. 1 Square Chimney Pots .. .. each	2	6
„ 2 „ „ .. .. „	1	9
Round Chimney Pots .. .. „	1	6
Chimney Hats .. .. „	1	2

PRICES AT BROOMIELAW, GLASGOW.

	s.	d.
Fire Bricks.		
Patent pressed, 2½ in. .. .. per 1000	60	0
„ 3 in. .. .. „	65	0
Unpressed, 2½ in. .. .. „	57	6
„ 3 in. .. .. „	60	0
Side and End Arch, Cupola and Circle .. .. „	60	0
Pups and Scones (or Closers and Levellers) .. .. .. „	60	0
Stable Bricks (Chamfered) .. .. „	90	0
Ground Fire Clay .. .. per ton	15	0
Flue Covers.		
Plain .. .. per cub. ft.	2/3 & 3/0	
Half-checked .. .. „	3/0 „ 3/6	
Glasshouse Blocks .. .. „	3/0 „ 3/6	
Paving Tiles.		
12 in. × 12 in. × 2 in. .. .. per 100	22	6
12 in. × 12 in. × 1½ in. .. .. „	20	0
9 in. × 9 in. × 2 in. .. .. „	15	0
9 in. × 9 in. × 1½ in. .. .. „	13	0
12 in. × 6 in. × 2 in., Glazed and Chequered .. .. „	15	0
Half Tiles charged two-thirds of whole price.		
Octagonal Tiles.		
6 in., with Black Squares .. .. per 100	25	0
9 in. „ „ .. .. „	30	0
Kiln Tiles.		
12 in. × 12 in. .. .. each	1	0
18 in. × 18 in. .. .. „	3	0

LONDON WHARF PRICES.

Description.	Size.	General Weight.	Price.
	in. in. in.	cwts. qrs. lbs.	£ s. d.
Improved Vitrified Drip Course .. each	12 × 5 × 4½	0 0 20	0 0 10
Corbel or Cornice Moulding .. .. „	14 × 6 × 3½	0 0 21	0 0 10
Half-round Coping for 9 in. Walls .. per 1000	9 × 4½ × 3	63 0 0	7 5 0
Ditto for 4½ in. Wall .. .. „	4½ × 9 × 4½	63 0 0	7 5 0
Ditto for 9 in. Wall (with drip) .. „	10½ × 4½ × 3	105 0 0	8 0 0
Ditto for 14 in. Wall (with drip) .. each	14 × 6 × 6	0 1 2	0 0 9
Ditto for 18 in. Wall (with drip) .. „	18 × 6 × 6	0 1 12	0 1 2
Curb Brick or Platform Coping .. per 1000	10 × 5 × 3	105 0 0	8 10 0
Ditto, ditto .. .. „	12 × 5 × 3	130 0 0	10 0 0
Ditto, ditto .. .. each	14 × 6 × 6	0 1 10	0 0 9
Ditto, ditto .. .. „	18 × 6 × 6	0 1 20	0 1 2
Railway Coping .. .. „	14 × 6 × 6	0 1 8	0 0 9
Ditto .. .. „	18 × 6 × 6	0 1 18	0 1 2
Saddle Back or Sharp Top Coping for 9 in. Wall .. .. per 1000	9 × 4½ × 3	56 0 0	6 15 0
Ditto for 4½ in. Wall .. .. „	4½ × 9 × 4½	56 0 0	6 15 0
Ditto for 9 in. Wall (with drip) .. „	11½ × 6 × 4	110 0 0	8 0 0
Ditto for 9 in. Wall (with drip) .. each	12 × 12 × 4	0 1 0	0 0 9
Ditto for 14 in. Wall (with drip) .. „	14 × 7 × 6	0 1 5	0 0 9
Barn-floor Brick, and for Suburban footpaths .. .. per 1000	9 × 4½ × 1½	50 0 0	5 5 0
Ditto, ditto .. .. „	10 × 5 × 2	70 0 0	6 5 0
Ditto, ditto .. .. „	10 × 5 × 2½	87 0 0	6 10 0
Ditto, ditto .. .. „	12 × 6 × 2	110 0 0	9 0 0
Ditto, ditto .. .. „	12 × 6 × 2½	130 0 0	10 0 0
Grooved and Channelled Stable Paving „	9 × 4½ × 2½	63 0 0	6 0 0
Ditto, ditto .. .. „	9 × 4½ × 2¾	72 0 0	6 10 0
Ditto, ditto .. .. „	9 × 4½ × 3	80 0 0	6 15 0
Plain Adamantine Stable Clinker .. „	6 × 2½ × 1¾	18 0 0	2 7 6
Channel ditto .. .. „	9 × 4½ × 3	70 0 0	7 0 0
Channel Adamantine Stable Clinker each	12 × 5 × 3	..	0 0 5
Ditto, ditto .. .. „	12 × 7 × 3½	..	0 0 6
Ditto, ditto .. .. „	12 × 9 × 4½	..	0 0 9
Ditto, ditto .. .. „	12 × 12 × 4	..	0 1 0
External Angle Saddle Back Coping „	9 × 9 × 6	..	0 1 6
External Angle Half-round Coping .. „	9 × 9 × 4½	..	0 1 6
Ditto, ditto .. .. „	14 × 14 × 6	..	0 3 0
Knotted Surface for footpaths .. .. per 1000	10 × 5 × 2	50 0 0	6 10 0
Chamfered Adamantine .. .. .. „	6 × 2½ × 1¾	18 0 0	2 13 0
2½ Beaded Garden Edging .. .. .. per 100	12 × 7½ × 1	6 0 0	0 17 0
Gothic Garden Edging .. .. .. „	9 × 7 × 1	3 0 0	0 19 6
Cable Garden Edging .. .. „	9 × 7 × 1	3 6 0	1 0 0
Double Chamfered Wall Coping .. per 1000	9 × 4½ × 3	70 0 0	6 10 0
4½ in. Cube, Grooved and Channelled (for Carriage Crossings) .. .. „	4½ × 4½ × 3½	48 0 0	5 0 0
5½ in. ditto, ditto .. .. „	5½ × 5½ × 4	67 0 0	5 15 0
9 in. ditto, ditto (for Street Crossings) each	9 × 9 × 4½	0 1 0	0 0 9
Channelled and Grooved Stable Paving .. .. per 1000	9 × 3½ × 3	60 0 0	5 15 0
Diamond Paving for Railway Platforms and Suburban Footpaths „	10 × 5 × 2	70 0 0	6 10 0
Ditto, ditto .. .. „	10 × 5 × 2½	87 0 0	7 10 0

LONDON WHARF PRICES—*continued.*

Description.	Size.	General Weight.	Price.
	in. in. in.	owts. qrs. lbs.	£ s. d.
Diamond Paving for Railway Platforms and Suburban Footpaths } per 1000	12 × 6 × 2	107 0 0	10 5 0
Ditto, ditto .. .. „	12 × 6 × 2½	127 0 0	12 10 0
Channel Brick, Grooved for Stables .. „	9 × 4½ × 3	70 0 0	7 0 0
8 in. Square Chamfered Stable Paving .. .. } „	9 × 4½ × 2½	63 . 0 0	6 0 0
Ditto, ditto .. .. „	9 × 4½ × 2¾	78 0 0	6 10 0
Ditto, ditto .. .. „	9 × 4½ × 3	84 0 0	6 15 0
Scollop Garden Edging .. .. .. per 100	9 × 7 × 1	2 2 0	0 17 0
Ditto, ditto, Pressed .. .. „	9 × 7 × 1	2 2 2	0 19 6
O. G. ditto .. .. „	7½ × 7½ × 1	2 1 7	0 9 6
Ditto, ditto, Pressed .. .. „	7½ × 7½ × 1	2 1 8	0 10 6
Ornament for Ridge Tile .. .. .. each	..	..	0 1 0
Spiked Ridge Tile (any pitch) .. .. „	18 in. long	0 0 14	0 1 11
Plain ditto, ditto .. .. „	18 „	0 0 10	0 0 7
Roll ditto, ditto .. .. „	18 „	0 0 12	0 0 11
Lapped ditto, ditto .. .. „	18 „	0 0 13	0 0 9
Gothic ditto, ditto (with ornament) .. „	18 „	0 0 16	0 1 11
Hip Tiles for Roofing .. .. .. „	..	0 0 4	0 0 6
Plain Roofing Tiles, Red .. .. .. per 1000	10½ × 6½	25 0 0	3 0 0
Ditto, ditto, Blue .. .. „	10½ × 6½	25 0 0	2 15 0
Ornamental ditto, Red .. .. .. „	10½ × 6½	24 0 0	3 5 0
Ditto, ditto, Blue .. .. „	10½ × 6½	24 0 0	3 0 0
Valley Tiles for Roofing .. .. .. each	..	0 0 4	0 0 6
Blue and Red Flooring Tile, Good .. per 1000	6 × 6 × 1	22 0 0	5 5 0
Buff ditto .. .. „	6 × 6 × 1	24 0 0	5 10 0
Best Pressed Red and Buff .. .. „	6 × 6 × 1	22 2 0	7 10 0
Ditto Black .. .. „	6 × 6 × 1	22 2 0	9 10 0
Red, Blue, and Buff .. .. „	9 × 9 × 1½	60 0 0	9 10 0

STAFFORDSHIRE BLUE BRICKS AND TILES, prime cost at Works.

Description.	Size.	Approximate Weight.	Price.
BLUE BRICKS.	Length. Width. Height.	tons. cwts.	s. d.
Common Blue Stocks	9 × 4½ × 3	3 15 per 1000	40 0
Selected Blue Stocks	.. ..	3 15 „	47 6
„ Culvert Bricks	.. ..	3 5 „	60 0
Best Blue Pressed Bricks	.. ..	3 15 „	55 0
„ Plain	.. ..	3 15 „	55 0
„ Plinth Brick	.. ..	3 5 „	60 0
„ „ Internal Angle ..	.. ..	3 5 „	63 0
„ „ External	.. ..	3 5 „	63 0
„ Header Plinth Brick ..	.. ..	3 5 „	75 0
„ Cant Brick	.. ..	3 5 „	75 0
„ Round Nosed Brick ..	.. ..	3 5 „	75 0
„ Bull Nosed	.. ..	3 5 „	75 0
„ Moulded Bricks	.. ..	3 5 „	85 0

STAFFORDSHIRE BLUE BRICKS AND TILES—*continued.*

Description.	Size.	Approximate Weight.	Price.
	Length. Width. Height.	tons. cwt.	s. d.
BLUE BRICKS.			
Best Blue Stable Bricks	9 × 3 × 4	3 15 per 1000	70 0
„ „	9 × 4½ × 3	3 15 „	70 0
„ „	9 × 4½ × 2½	3 5 „	60 0
„ Arch Bricks	.. ..	3 5 „	75 0
„ Culvert Bricks	.. ..	3 5 „	75 0
Platform Bricks	.. ..	20 lbs. each	0 3½
Window Sill Bricks..	9 × 4 × 3½	7 „	0 1½
„ Angle..	.. ..	7 „	0 2
Paving Bricks	9 × 4½ × 3	3 15 per 1000	55 0
„	9 × 4½ × 2	2 12 „	45 0
„	10 × 5 × 2	3 5 „	50 0
„	12 × 6 × 2	4 15 „	90 0
Chequered Paving Bricks	.. ..	..	per M. extra
Knotted „	9 × 4½ × 2	..	2 6
„ „	10 × 5 × 2	..	3 6
„ „	12 × 6 × 2	..	5 0
WALL COPING.			
Half Round	4½ × 9 × 3	3 0 „	75 0
Saddle Back	12 × 4½ × 3	6 lbs. each	0 1½
„	12 × 5½ × 3	7 „	0 2½
Half Round	6 × 9 × 5	10 „	0 2
„ Stop end	6 × 9 × 5	8 „	0 8
„ Angle	6 × 9 × 5	15 „	0 9
„ T Angle	6 × 9 × 5	20 „	1 0
Saddle Coping	6 × 12 × 3	11 „	0 2½
„	12 × 12 × 4½	20 „	0 4½
„ Stop end	12 × 12 × 4½	15 „	1 0
„ Angle	12 × 12 × 4½	30 „	1 3
„ T Angle	12 × 12 × 4½	40 „	1 6
„	12 × 16 × 5	30 „	0 7½
„	12 × 18 × 5	34 „	0 9
Round Nosed Coping	6 × 14 × 6	26 „	0 5
CHANNEL BRICKS.			
Channel Bricks	9 × 4½ × 3	7 „	0 1½
„	12 × 6 × 3	13 „	0 3
„	12 × 8 × 4	15 „	0 4½
„	13 × 5½ × 3	13 „	0 3
SOUGH GRIDS.			
Sough Grids	6 × 6	5 „	0 4
„	9 × 9	11 „	0 6
„	12 × 12	20 „	0 9
Frames for Grids made to order.			
MANGER BLOCKS.			
Manger Blocks	11 × 9 × 4	20 „	0 6
„	9 × 8 × 4	15 „	0 4½
Backs and Bottoms	9 × 9 × 1½	6 „	0 1½
AIR BRICKS, Red, Blue, and Buff.			
Air Bricks	9 × 3 × 3	4 „	0 3½
„	9 × 6 × 3	9 „	0 7
MALT KILN TILES.			
Malt Kiln Tiles	12 × 12 × 2	175 = 1 ton	0 7

HARD, GLAZED AND ENAMELLED BRICKS, ETC.
Price List—Delivered on Trucks at Leeds.

Stock Size—9 by 4½ by 2½ in.	Ivory White.			Creams and Buffs.			Browns, Red Browns, Blacks, Greys, and all Tints of Greens or Blues.			Reds.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Glazed on one side	10	0	0	13	0	0	15	0	0	19	0	0
„ one end	9	0	0	12	0	0	14	0	0	18	0	0
„ one side and end ..	14	0	0	17	10	0	19	10	0	25	0	0
„ bull-noses	14	0	0	17	10	0	19	10	0	25	0	0
„ 4½ inch or flat	14	0	0	17	10	0	19	10	0	25	0	0
„ two sides	15	0	0	18	10	0	21	0	0	29	0	0
„ two ends	13	0	0	16	10	0	18	10	0	24	0	0
„ one side and two ends	16	0	0	20	0	0	22	10	0	31	0	0
„ Chamfers, Squints, Cants, and Octagon	17	0	0	21	0	0	23	10	0	32	0	0
„ two sides and one end	17	0	0	22	10	0	25	0	0	33	0	0

Opalite Bricks delivered in London at above prices except reds.

Patent porous fire and sound-proof bricks and fixing blocks, price on Wharf, London, 60s. per 1000.

CANDY & Co.'s VITRIFIED GRANITIC Paving and Facing Bricks, tested to withstand a pressure of 445 tons per foot. Glazed Bricks, Fire Bricks, Stoneware Goods, and Terra Cotta,

From 70s. to 90s. per 1000, at London stations.

STOURBRIDGE FIRE.

	s.	d.
Lumps, 12 in. × 9 in. × 4½ in. .. .. each	0	11
„ 14 in. × 9 in. × 4½ in. .. .. „	1	1
„ 16 in. × 9 in. × 4½ in. .. .. „	1	3
„ 18 in. × 9 in. × 4½ in. .. .. „	1	5½
„ 20 in. × 9 in. × 4½ in. .. .. „	1	7½
„ 24 in. × 10 in. × 5 in. .. .. „	2	4
„ 26 in. × 10 in. × 5 in. .. .. „	2	6½
„ 28 in. × 10 in. × 5 in. .. .. „	2	8½
„ 30 in. × 10 in. × 5 in. .. .. „	2	10½
„ 36 in. × 12 in. × 6 in. .. .. „	5	6
Tiles .. 9 in. × 9 in. × 2 in. .. .. „	0	4½
„ 10 in. × 10 in. × 2 in. .. .. „	0	5½
„ 12 in. × 12 in. × 2 in. .. .. „	0	6½
„ 12 in. × 12 in. × 2½ in. .. .. „	1	3
„ 14 in. × 14 in. × 2½ in. .. .. „	1	0
„ 16 in. × 16 in. × 2½ in. .. .. „	1	4½
„ 18 in. × 18 in. × 2½ in. .. .. „	1	7½
„ 20 in. × 20 in. × 3 in. .. .. „	2	5½
„ 22 in. × 22 in. × 3 in. .. .. „	3	0
„ 24 in. × 24 in. × 3 in. .. .. „	3	6
Slabs .. 16 in. × 9 in. × 2½ in. .. .. „	1	1
„ 18 in. × 9 in. × 2½ in. .. .. „	1	5½

STOURBRIDGE FIRE—*continued.*

		s.	d.
Slabs..	18 in. × 12 in. × 3 in. .. .. each.	2	1
,,	20 in. × 9 in. × 2½ in. .. .. ,,	1	10
,,	20 in. × 9 in. × 3 in. .. .. ,,	2	4½
,,	24 in. × 9 in. × 2½ in. .. .. ,,	2	1
,,	24 in. × 12 in. × 3 in. .. .. ,,	2	10½
,,	26 in. × 9 in. × 2½ in. .. .. ,,	2	5½
,,	28 in. × 9 in. × 2½ in. .. .. ,,	2	8½
,,	28 in. × 12 in. × 3 in. .. .. ,,	3	3
,,	30 in. × 9 in. × 2½ in. .. .. ,,	3	0

Patent Fire-brick Beehive Backs, for Smoky Chimneys.

	s.	d.		s.	d.
12 in. opening .. each	7	3	20 in. opening .. each	15	0
14 ,, .. ,,	9	0	22 ,, .. ,,	18	0
16 ,, .. ,,	10	3	24 ,, .. ,,	21	8
18 ,, .. ,,	12	0			

Fire-brick Stove Backs, for Sham Registers,

8 in. backs .. .. each	3	0	14 in. back .. .. each	6	0
10 ,, ... ,,	3	9	16 ,, ... ,,	7	3
12 ,, ... ,,	4	10			

Fire Bricks, 110*s.* per 1000.

CERALITE PATENT GLASS-FACED BRICKS.

Delivered free in London.

Plain Glazed Brick, 9 in. × 4½ in. × 2½.	White Ceralite, per 1,000.			Buff and Cream Ceralite, per 1,000.			Other Ceralite Colours, per 1,000.		
	£	s.	d.	£	s.	d.	£	s.	d.
Glazed on one side	10	0	0	12	0	0	15	0	0
,, ,, nicked for closures ..	11	0	0	13	0	0	16	0	0
,, one end	9	10	0	11	10	0	14	10	0
,, one side and one end	14	0	0	16	10	0	19	10	0
,, 4½ in. side	14	0	0	16	10	0	19	10	0
,, Bullnose..	14	0	0	16	10	0	19	10	0
,, two sides	15	0	0	17	10	0	21	0	0
,, two ends..	13	0	0	15	10	0	18	10	0
,, one side and two ends..	16	0	0	19	0	0	22	10	0
,, two sides and one end..	17	0	0	21	10	0	25	0	0
,, cants or chamfered	17	0	0	20	0	0	23	10	0
SPECIALITY:—									
Half Bricks (9 in. × 1½ in. × 2½ in.), glazed on one side	8	0	0	10	0	0	13	0	0

Fourteenth Edition, Royal 32mo, roan, 5*s*.

ARCHITECT'S HANDBOOK

A Handbook of Formulæ, Tables, and Memoranda, for Architectural Surveyors, and others engaged in Building.

By J. T. HURST, C.E.

CONTAINING:

Formulæ and Tables for the Strength of Materials, Roofs, Water Supply, Drainage, Gas, and other matters useful to Architects and Builders.

Information connected with Sanitary Engineering.

Memoranda on the several Trades used in Building, including a description of Materials and Analyses of Prices for Builders' Work.

The Practice of Builders' Measurement.

Mensuration and the Division of Land.

Tables of the Weights of Iron and other Building Materials.

Constants of Labour.

Valuation of Property.

Summary of the Practice in Dilapidations.

Scale of Professional Charges for Architects and Surveyors.

Tables of English and French Weights and Measures.

E. & F. N. SPON, 125 Strand, London.

New York: Spon & Chamberlain, 12 Cortlandt Street.

[*To face p.* 184.

PATENT VICTORIA STONE.

Established 1868.

Registered Trade Mark **"VICTORIA STONE."**

BRONZE MEDAL: Sanitary Exhibition, 1883.
The only Medal at the International Health Exhibition for Artificial Flag Stone, 1884.
The only Medal for Artificial Stone Paving at the Leicester Exhibition, 1885.
GOLD MEDAL: International Exhibition, Crystal Palace, 1884.
GOLD MEDAL: Building Trades Exhibition, 1886.
By Appointment to the Health Exhibition, 1884.
GOLD MEDAL: International Exhibition, Alexandra Palace, 1885.
Diploma of Honour: International Fisheries Exhibition, 1883.
By Appointment to the Royal Agricultural Society.
GOLD MEDAL: Mining Exhibition, Crystal Palace, 1890.

It has been used in the largest

ASYLUMS, SCHOOLS, AND BARRACKS

in England, for Landings, Steps, Sills, and Heads.

AS PAVING **it has stood the test of 27 years' traffic in London.**

INDURATED CONCRETE SLABS AND IN-SITU PAVING.

In view of the extension of powers under Local Government Acts to comparatively rural districts, the Company manufacture, on a large scale, cheap and useful first-class Concrete Slab Paving, and lay Paving *in situ*, in order to meet the requirements of places where traffic is less severe, and where the first cost is of importance.

Paving on deferred payments extending over twenty years.

Laid on London Bridge, and also on Tower Bridge, where the Foot Traffic exceeds any in the world. This Pavement will last a century in ordinary Suburban Roads.

THE PATENT VICTORIA STONE CO., LD.

Secretary and Manager—Mr. HARRY ROGERS.

Offices: 283a KINGSLAND ROAD;

WORKS: STRATFORD MARKET (GREAT EASTERN RAILWAY), ESSEX;
AND AT
GROBY QUARRIES, NEAR LEICESTER.

MASON.

PORTLAND, BATH,* AND CAEN STONE.

	Per Foot Cube.	
	Portland.	Bath and Caen.
	s. d.	s. d.
In block at wharf	2 11	1 11
„ „ including cartage within five miles, and waste	3 7	2 9
In block, including hoisting, scaffolding, and setting	4 6	3 6
„ if above 6 ft. long add	0 6	0 4
„ if hoisted above 30 ft., for every 10 ft. in height add	0 2	0 2
Labour, in addition to the price of Stone and Setting.	per ft. sup.	
Sawing	0 8	0 3
Plain work to beds and joints, one face measured for two	1 0	0 7
„ to beds of bond stones	0 11	0 6
„ to rubbed or combed face	1 4	0 8
„ „ „ „ (circular)	1 11	1 0
„ (sunk work)	1 9	1 0
„ (circular)	2 4	1 3
„ „ (rubbed)	2 1	1 4
Moulded work	2 0	1 5
„ (stopped)	3 0	1 6
„ (circular)	3 3	1 7
Moulded work (Gothic)	3 6	1 10
„ (Gothic, circular)	4 2	2 1
Columns (circular plain work to shafts)	2 2	1 3
„ (circular moulded work to caps and bases)	3 4	1 8
Ashlar, 4 in. thick, including beds, joints, and face	2 7	1 8
„ for every additional inch in thickness add	0 7	0 4½
„ if with bond stones, average 7 ft. apart, and each containing 24 in. cube add	1 6	1 0
Slabs, jambs, mantles, or shelves, 1 in. thick	1 8	1 3½
„ „ „ 1¼ in. thick	1 11	1 5
„ „ „ 2 in. thick	2 3	1 7
„ „ „ 2½ in. thick	2 7	1 9
„ „ „ 3 in. thick	2 11	1 11
Paving, rubbed, in straight courses, 1¼ in. thick	1 10	1 2½
„ For every ¼ in. extra thickness add	0 3	0 2
„ If in 2-ft. squares, laid diagonal add	0 5	0 4
Old paving taken up, squared, and relaid	0 4½	0 4½
„ „ sanded	0 7	0 7
„ „ set in cement	0 9	0 9
Landings, plain face both sides, set complete, 3 in. thick	3 1	2 1
„ For every ¼ in. extra thickness add	0 4	0 3
„ If more than 6 ft. long add	0 4	0 3
Sinks, 5 in. thick	4 6	3 0
„ 6 „	5 6	3 9
„ For every additional inch in thickness add	1 0	0 6

* Bath stone is sometimes approximately priced at 4*s.* 0*d.* to 4*s.* 9*d.* per foot cube for all materials and labour in ordinary work, such as sills, heads, quoins, jambs, weatherings, &c.; Portland, in a similar manner, at 6*s.* to 7*s.* 6*d.*

PORTLAND, BATH, AND CAEN STONE—*continued.*

	Per foot run.	
	Portland.	Bath and Caen.
	s. *d.*	*s.* *d.*
Window sills, weathered and throated, 8 in. × 3 in.	1 9	1 4
„ weathered and throated, 8 in. × 4 in.	2 9	2 0
„ For every ¼ in. extra thickness	0 4	0 3
Coping, throated and set, 12 in. × 2½ in.	2 6	1 8
„ „ „ 18 in. × 2½ in.	3 3	2 4
„ squared and reset, 12 in.	0 7	0 7
Curbs, including joints and setting, 6 in. × 6 in.	2 0	1 6
„ „ 7 in. × 6 in.	2 4	1 9
„ „ 8 in. × 6 in.	2 8	2 0
Curbs. If with circular top .. .. add	0 4	0 3
Joggling, sunk to 3-in. and 4-in. landings, in cement	1 4	1 0
„ „ „ „ run with lead ..	1 8	1 4
„ 5-in. 6-in. „ in cement	1 10	1 4
„ „ „ „ run with lead ..	2 3	1 10
Cutting and pinning to steps, landings, &c., in cement.. ..	1 2	1 2
Throating or chamfer	0 2	0 1
Back joint	0 2	0 1
Sunk rebates, 2 in. × ¾ in.	0 4	0 2
.. rustics, 2 in. deep	0 6	0 3
1-in. bead	0 3	0 1½
¼-in. flutes or reeds	0 2½	0 1½
1-in. „ „	0 3	0 2½
1½-in. flutes to columns	0 4	0 3
Double-reeded edges	0 4	0 3
	each.	
1-in. holes for rails	0 2	0 1
3-in. „ „	0 4	0 3
Chimney-cramps	0 4	0 3
„ „ run with lead	0 7	0 5
Notches to slabs	0 5½	0 3
Pipe-holes to sinks	0 9	0 6
Washers let in sinks	0 9	0 6
6-in. traps „ „	1 6	1 2
1-in. iron plugs, run with lead	0 6	0 5
Sunk letters, per inch	0 1½	0 1

YORKSHIRE STONE.

	Per ft. cub.
	s. *d.*
In blocks, including hoisting and setting	4 3
„ if above 6 ft. long .. .. add	0 5
Labour.	
	per ft. sup.
Plain work, including sawing	1 4
„ „ „ (circular)	1 11
„ sunk	2 0
„ „ (circular)..	2 3
Moulded work	2 8
„ (circular)	3 2
If rubbed .. .. add	0 5

YORKSHIRE STONE—*continued.*

Materials and Labour.	Per ft. sup. s.	d.
Paving, laid in straight courses, 2 in. thick	0	10
" " " " 2½ in. "	1	0
" " " " 3 in. "	1	2
" " " " 4 in. "	1	4
" " " " if rubbed .. .. add	0	4
Paving, laid in straight courses. If set in cement .. .. .. add	0	2
Old paving taken up, squared, and relaid	0	3
2½-in. rubbed hearths	1	9
Landings, including setting, 3 in. thick, tooled	3	0
" " " 4 in. " "	3	3
" " " 5 in. " "	3	6
" if rubbed .. .. add	0	4
" if more than 5 ft. long .. .. add	0	3
Sinks, 6 in. thick	3	9
Joggle joints to 3-in. landings .. .. per ft. run	1	3
" to 4-in. " .. .. "	1	6
" to 5-in. " .. .. "	1	8
" to 6-in. " .. .. "	1	10
" if run with lead .. .. add	0	4

Quarry-worked Materials.	Per ft. run.
Coping, 12 in. × 2 in., throated	1 10
" 12 in. × 3 in. "	2 3
" 18 in. × 2 in. "	2 6
" 18 in. × 3 in. "	3 3
Window sills, weathered and throated, 7 in. × 2½ in.	1 2
" " " 8 in. × 3 in.	1 7
" " " 8 in. × 4½ in.	2 0
Solid steps, 9 in. × 6 in., rubbed top and face	3 0
" 12 in. × 6 in.	3 4
Curb, 4 in. × 6 in.	1 10
" 6 in. × 6 in.	2 2
" 8 in. × 6 in.	2 6
" 9 in. × 6 in.	3 0
Throat	0 2 each.
Drain stone, dished	3 6
Five-hole sink stones	2 4
Holes for pipes	0 9
Letting in washers	1 0
1" holes for ironwork	0 3
Coping cramps, let in with cement	0 6
" run with lead	0 9
Plain ends to steps	1 0

PURBECK STONE.

	s.	d.
Paving, tooled, in random courses .. .. per ft. super.	1	2
" " in straight " .. .. "	1	5
" rubbed " " .. .. "	1	10
If set in cement .. .. add "	0	2
Old paving taken up, squared, and relaid .. .. .. "	0	4
Steps, 10 × 6 .. .. per ft. run	3	0

BEST HARD YORKSHIRE STONE FROM RADFIELD QUARRY, ECCLESHILL, NEAR LEEDS.

Ashlar or block stone, first-class stone of good uniform colour.
Flag stone for landings, flags, &c.
Prices on trucks at the quarries.

ASHLAR.	s.	d.
Random sizes .. .. per ft. cube	1	4
Dimensions .. .. „	1	6

FLAGS—Random Sizes, per yard superficial.

	1¼ in.		2 in.		2½ in.		3 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Self-faced	1	3	1	10	2	8	2	9
Tooled	1	8	2	8	3	6	3	6
Polished	2	8	3	9	4	2	4	2

BEST HARD YORKSHIRE STONE—*continued.*

LANDINGS—Ordinary Sizes.

	Per Foot Superficial.							
	3 in.		4 in.		5 in.		6 in.		7 in.	
	d.		s.	d.	s.	d.	s.	d.	s.	d.
Self-faced	6		0	8	0	10	1	0	1	2
Tooled	8		0	10	1	0	1	2	1	4
Polished	11		1	1	1	3	1	5	1	7

	s.	d.
Self-faced landings under 30 ft. super., per ft. cube	2	0
If tooled one side, 2*d.* per ft. super. extra.		
„ polished „ 5*d.* „ „		
„ tooled both sides, 7*d.* „ „		
„ polished „ 1*s.* 1*d.* „ „		
Tooled steps, 12 in. × 6 in. .. .. per ft. lin.	1	2
„ 12 in. × 7 in. .. .. „	1	3½
„ 12 in. × 8 in. .. .. „	1	5
„ 12 in. to 15 in. × 6 in., under 6 ft. long .. ..per ft. super.	1	2
Polished steps, ditto .. .. „	1	8
Tooled sinks, 6 inch .. .. „	1	4
„ coping, 12 in. × 3 in. .. .. per ft. lin.	0	9
Pitched faced wallstones .. .. ..per yd. super.	2	6
Hammer dressed „ .. .. .. „	2	4

See Appendix.

Weldon Stone.

Carbonate of lime	94·35
„ magnesia	3·55
Iron (as peroxide)	·61
Alumina	·28
Silica	·08
Moisture, with traces of organic matter, manganese, &c.	1·13
	100·00

Its specific gravity is from 2·42—2·45.

The stone is delivered free on rails at Weldon and Corby Station. The price (on rails) is :—

A. Upper bed (medium grained) .. .. .. 1*s.* 2*d.* per cubic foot.
A1. Lower bed (fine grained) .. .. 1*s.* 4*d.* „ „

The above prices refer to a 16-ft. average.

Moore Stone.

	s.	*d.*
Paving, 4 in. thick per ft. super.	2	0
„ 6 „ „	2	6
Step 12 × 6 per ft. run.	2	10
Curb 9 × 6 „	2	6
Cutting channel „	1	9
Craigleith Stone.		
In block, including hoisting and setting per ft. cube	6	0
Plain work „	1	6
Sunk „	2	6
Moulded „	3	0
„ (circular) „	4	0
Kentish Rag.		
Random walling per yard cube	16	6
„ coursed walling „	19	6
Square „ „	22	6
Hammer-dressed face per ft. super.	0	4
„ „ quoins per ft. run	1	2
Pointing with blue ash mortar per yard super.	1	8

Prime Cost Prices of Stones in General Use.

	s.	*d.*
Aberdarne Sandstone.		
Blocks, at quarry per ton	11	0
Walling per ft. cub.	2	3
Ditto, rough „	1	3
Paving „	1	9
Ayrshire Red Sandstone.		
Blocks, in London „	1	9
Ancaster Oolitic Stone.		
Random block, in trucks at Ancaster „	1	2
Ditto, at King's Cross, London „	1	9
Walling stones per ton, on rail at Ancaster	5	0
Aubigny Stone.		
In block, f. o. b. per ft. cub.	1	10
At London or Channel Ports (alongside) „	2	3

BATH STONE.

In railway trucks, full loads, random block, per foot cube.

	Corsham Down.	Box Ground.	Farleigh Down.	Combe Down.	Stoke Ground.	Winsley and Westwood.	Bethel.
In Railway Trucks at	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Quarry Stations	0 11	0 11	0 11	0 11	0 11	0 11	0 11
Bristol Station	1 1	1 1	1 1	1 1	1 1	1 1	1 1
Paddington Station	1 5	1 5	1 5	1 5	1 5	1 5	1 5
Ditto High Level ..	1 6	1 6	1 6	1 6	1 6	1 6	1 6
Nine Elms Station	1 6½	1 6½	1 6½	1 7	1 6½	1 6½	1 6½
Bristol Harbour..	1 1½	1 1½	1 1½	1 1½	1 1½	1 1½	1 1½
On Wagons at							
Paddington Depot	1 5½	1 5½	1 5½	1 5½	1 5½	1 5½	1 5½
Nine Elms Depot	1 7½	1 7½	1 7½	1 7½	1 7½	1 7½	1 7½

Selected Blocks, 1*d.* per foot cube extra.

Paving.—3 in. Corn Grit or Corsham, at 3*d.* per foot super.

Ashlar.—Random Corsham Down Ashlar, from 4 to 8 inches thick, 2*d.* per foot cube less than block.

Box Ground Ashlar, same thickness, ½*d.* per foot less than block.

Range Stone.—Sawn Corsham Down Range Stone, same price per foot cube as Ashlar.

This stone is cut to range in courses, 6, 7, 8, 9, and 10 in. deep, and varies from 4 to 5 in. wide. Four yards make a ton.

With but few exceptions Bath Stone should be laid upon its natural bed, as in this position it is found to weather better, and is also capable of carrying greater weight. This should be made a *sine qud non*, as favourable results depend upon it. Cornices and Copings are, however, found to stand the weather better when worked joint-bedded, and in consequence are generally so placed; but when this is done care should be taken that the Angle-quoins to the Cornice and Coping are upon the natural bed of the stone, as, if put joint-bedded, one side would be face-bedded. Tracery Windows should be worked face-bedded, to avoid the bed running across the point or cusp.

It should also be noted as a never-to-be-departed-from rule, that "Box Ground" should be used in all damp positions near the ground line, and for Plinths, Weatherings, Sills, Cornices, and Copings, or for any part of a building having a very exposed aspect, or where any special necessity or circumstance call for a thorough weather stone.

Stoke Ground, Winsley Ground, Westwood Ground, and Bethel are adapted for the less exposed parts of a building, and for interior purposes. They are easy-working and economical, and when dry they are fair weather stones.

Corsham Down and Farleigh Down are very fine, even-textured, mild, rich-coloured, free-working building stones, very largely used for general purposes in positions not too much exposed, and specially adapted for interior use and decorative work, such as Pulpits, Fonts, Reredos, Screens, Carved Figures, &c.

Corngrit is a very strong, compact, close-grained stone, found below the finer beds of Corsham Down, and is especially suited for weight-bearing purposes, such as Church Columns. It is also extensively used for landings and staircases. Not being a first-class weather stone its use is not recommended externally.

Combe Down is a good weather stone when obtained from the best beds, but as these are now practically exhausted, the supply is irregular in quality and cannot be relied upon.

THE BATH STONE FIRMS,

LIMITED.

Telegrams:
"OOLITE, BATH."
"OOLITE, LONDON."

Head Office . . **ABBEY YARD, BATH.**

London Depots { **G.W.R., WESTBOURNE PARK, W.**
L. & S.W.R., NINE ELMS, S.W.

INCORPORATING—

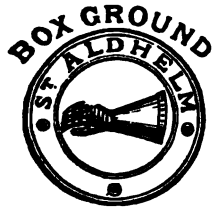
PICTOR & SONS,
RANDELL, SAUNDERS & CO., LTD.,
L. SUMSION,
CORSHAM BATH STONE CO., LTD.,
S. R. NOBLE,
STONE BROS., LTD.

QUARRIES—

BOX GROUND,
CORSHAM DOWN,
CORNGRIT,
MONKS PARK,
FARLEIGH DOWN,
COMBE DOWN,
WINSLEY GROUND,
STOKE GROUND,
WESTWOOD GROUND.

WE quarry all the above descriptions of Bath Stone. The inferior beds we leave unquarried, and are thus enabled to supply stone of a high average quality. Our output of Corsham Stone was never so uniformly good as it is to-day.

Our "Box Ground" is a thoroughly reliable weather stone. It is the only kind of Bath Stone that is brought out from the mine, freshly hewn and full of quarry sap, into the hardest frosts. Its well-known reliableness has led to other and very different stones being sold under its name, or under names bearing a specious resemblance to it. This practice involves serious risks. As a protection, we brand every block of our Box Ground stone with the accompanying registered Trade Mark, so that our friends can make sure of having stone from the same beds from which were built Malmesbury Abbey, 8th Century; Lacock Abbey, 13th Century; Edington Church, 14th Century; Longleat, 16th Century, &c. &c., whose sound condition to-day proves the genuine Box Ground stone to be thoroughly enduring.



Registered
TRADE MARK.

Registered
TRADE MARK

Our "Monks Park" stone is compact, close-grained, and very strong. It is remarkably even in texture and uniform in colour. It carries a sharp arris, and is handsome in appearance. In London, in manufacturing centres, and at the seaside it resists with great success the attacks of the acids and salt in the atmospheres. For this stone the accompanying Trade Mark is registered, and the genuineness of the supply can be insured by having each block of stone so branded.

THE BATH STONE FIRMS, LTD., BATH.

See back of this leaf. [*To face page* 190.

"Fluate"

FOR HARDENING, PRESERVING, AND MAKING WATERPROOF, STONE, BRICKS, MARBLE, &c.

What it is. "Fluate," ready for use, is a clear, colourless liquid.

Fluate of Magnesia, for substances naturally possessing much lime (such as Portland and Bath Stone) is in crystals, which readily dissolve in cold water.

"Avant Fluate," which furnishes the lime to substances naturally destitute of it, is a dense liquid. Water is added as required.

What it does. Hardens and permanently preserves all stones, bricks and marbles that will imbibe the liquid.

Arrests decay in old work, and prevents it in new work.

Waterproofs porous brickwork and stonework, whether sand or limestone.

Obviates the necessity for costly restorations.

Succeeds completely and uniformly.

What it does not do. Does not paint, glaze, varnish, or discolour.

Does not and cannot fail to be permanent.

How applied. Just as whitewash is applied, requiring no more skill or labour.

What it costs. One penny per superficial foot of surface treated.

Where used. Westminster Abbey, St. Paul's Cathedral, Buckingham Palace, Lambeth Palace, and in numerous buildings throughout the country.

Pamphlet and all particulars free on application to

THE BATH STONE FIRMS, LTD., BATH.

[See back of this leaf.

PRICES OF STONES—*continued.*

The following are the Prices of Bath Stone (Corsham Down and Box Ground Stone), delivered at the several places named, in random blocks per foot cube:—

	s.	d.		s.	d.
Abergavenny	1	5	Gravesend	1	8
Aberystwith	1	11½	Guildford	1	4½
Aldershot	1	4½	Hampton, Middlesex	1	5
Barnstaple	1	5½	Hartlepool	2	1
Basingstoke	1	3½	Hastings	1	7½
Battersea	1	6½	Hereford	1	4
Berkhampstead	1	5½	Ipswich	1	10½
Birmingham	1	4	Kidderminster	1	5
Bournemouth	1	3½	Leicester	1	6½
Brentford, F.O.B.	1	4½	Lewisham	1	7
Bricklayers' Arms	1	5½	Lincoln	1	9
Bridlington	2	1	Liverpool	1	10½
Brighton	1	7½	Maidstone	1	7½
Burton-on-Trent	1	6	Manchester	1	9
Bury St. Edmunds	1	8½	Newark	1	8½
Cambridge	1	7½	Newcastle-on-Tyne	2	2½
Canterbury	1	8	Newmarket	1	8
Cardiff	1	4½	Northampton	1	5½
Carlisle	2	3½	Norwich	1	11
Chatham	1	7½	Oxford	1	3
Chelmsford	1	8½	Penzance	1	10
Cheltenham	1	2½	Peterborough	1	7½
Chertsey	1	4½	Plymouth	1	7½
Cirencester	1	1½	Reading	1	3½
Colchester	1	10	Richmond	1	6
Coventry	1	5½	Rugby	1	6
Croydon	1	6½	Salisbury	1	1½
Derby	1	6½	Scarborough	2	0½
Doncaster	1	8½	Sheffield	1	8½
Dover	1	8	Southampton	1	3½
Epsom	1	5½	Swansea	1	5½
Exeter	1	4	Tunbridge	1	7
Falcon Lane	1	6½	Weymouth	1	3½
Finsbury Park	1	6½	Windsor	1	3½
Folkestone	1	8½	Wolverhampton	1	4½
Forest Hill	1	6½	Worcester	1	3½
Gloucester	1	2	York	1	11

	s.	d.
BEER, DEVONSHIRE FREESTONE.		
Blocks at quarry ... per ft. cube	0	9
Ditto in London, delivered ... „	1	4
Ditto in truck at Seaton ... „	0	10
BERWIG QUARRIES, MINERA, NEAR WREXHAM.		
Sandstone on trucks at quarry ... „		
CAEN STONE.		
In block, f. o. b. ... „	0	9
Alongside in London and Channel Ports ... „	1	2
CAMPDEN STONE, CHIPPING CAMPDEN, GLOUCESTERSHIRE.		
This stone is a carbonate of lime, with oolitic grains, partly crystalline, colour rich orange cream, best bed very fine in texture, blocks up to 20 or 30 ft. cube.		
Best beds in random blocks at quarry ... per ft. cube	1	0
„ „ on trucks at Chipping Campden Station ... „	1	3
Hammer-dressed square facings in courses from 2 in. to 10 in. high, on trucks at Chipping Campden Station ... per ton.	8	6
A ton covers about 5 yards superficial. Weight, 140 lbs. per ft. cube.		

PRICES OF STONES—*continued.*

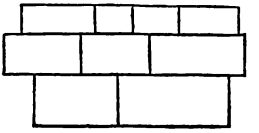
	£. d.
CASTERTON STONE—LIKE KETTON.	
Free on rail at Stamford, blocks .. .. per ft. cube	1 6
Selected .. .. „	1 7
CHILMARK AND WARDOUR LIMESTONES.	
Random blocks on trucks at Tisbury, hard, not exceeding 16 ft. cube .. .. per ft. cube about	1 3
Ditto, at Nine Elms .. .. „	1 7½
Large or selected blocks, extra from .. .. „	2 0
GREEN SANDSTONE, same price.	
CORSEHILL STONE.	
On truck at quarry .. .. „	1/ to 1/2
Ditto in London .. .. „	2/4 to 2/6
On wharf „ .. .. „	2/6 to 2/8
DOULTING FREESTONE.	
This stone is a crystalline limestone of uniform tint, homogeneous in structure, durable, and of a warm cream colour.	
Prices, random block on rail .. .. per ft. cube	0 10½
To given dimensions, extra .. .. „	0 1
Weight, 16 ft. = 1 ton.	
Labour prices (as given at Quarry).	
Labour to beds and joints.. .. .. per ft. super.	0 2
„ plain face .. .. „	0 5
„ „ circular .. .. „	0 8
„ plain moulded work .. .. „	0 10
„ circular „ .. .. „	1 2
„ plain sunk work .. .. „	0 9
„ „ circular .. .. „	1 0
Delivered in random block at Paddington Station .. per ft. cube	1 5
DUKES QUARRIES, DERBYSHIRE SANDSTONE.	
Blocks on trucks at Whatstandwell .. .. „	0 10
Ditto at St. Pancras .. .. „	1 7
DUMFRIES RED SANDSTONE, LOCHARBRIGGS QUARRY.	
Blocks at quarry .. .. „	0 8
Ditto, London, not exceeding 10 ft. cube .. .. .. „	2 4
Ditto, „ „ 20 „ .. .. .. „	2 6
Ditto, „ „ 30 „ .. .. .. „	2 8
Ditto, „ „ 40 „ .. .. .. „	2 10
GATHERLEY MOOR SANDSTONE.	
Dimension Ashlar, at quarry .. .. „	1 3
Ditto, at London .. .. „	2 9
Ditto, extra large, at quarry .. .. „	1 6
Ditto, at London .. .. „	3 0
Random Ashlar, at quarry .. .. „	1 2
Ditto, at London .. .. „	2 8
GRIMSHILL.	
Fine white sandstone, on truck at quarry .. .. .. „	10d. to 1/1
Ditto, London .. .. „	1/8 to 1/11

PRICES OF STONES—*continued.*

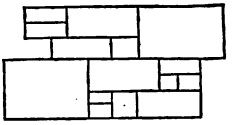
	s.	d.
HAM HILL STONE.		
Random blocks, 20 ft. cube, at quarry .. .. per ft. cube	1	0
At Paddington .. .. „	1	11
Selected blocks, extra .. .. „	0	1
Sawn to dimensions, extra .. .. „	0	6
HAYDOR STONE, OOLITE.		
Same price as Ancaster stone.		
HAYSHAW MOOR.		
White silicious gritstone, on truck at quarry .. .. „	0	10
Ditto, in London .. .. „	1	9
The above prices to sizes.		
HARTWITH.		
Fine-grained sandstone, on truck at quarry .. .. „	1/ to 1/2	
Ditto, at King's Cross or Camden .. .. „	2/ to 2/2	
HOLLINGTON SANDSTONE.		
In blocks, on trucks at quarry .. .. „	1	0
Selected .. .. „	1	6
HOPTON WOOD, DERBYSHIRE LIMESTONE.		
Blocks at quarry.. .. .. „	2	0
At London station .. .. „	2	10
From the saw, on rail at the works.		
Sawn landings, up to 4 ft. square.		
5 in. thick .. .. per ft. sup.	2	6
6 in. „ .. .. „	3	0
7 in. „ .. .. „	3	6
Sawn landings, 6 ft. square.		
5 in. thick .. .. „	3	0
6 in. „ .. .. „	3	6
7 in. „ .. .. „	4	3
Square and bevel steps, up to 5 ft. long.		
5 in. thick .. .. „	2	3
6 in. „ .. .. „	2	9
7 in. „ .. .. „	3	3
7 ft. long.		
5 in. thick .. .. „	2	9
6 in. „ .. .. „	3	3
7 in. „ .. .. „	4	0
Sawn pavings, in random or irregular courses, cleansed on face.		
Slabs under 4 ft. long, 1¼ in. thick .. .. per ft. sup.	0	8
Ditto, 2 in. thick .. .. „	0	10
Ditto, 3 in. „ .. .. „	1	2
Slabs 4 to 6 ft. long, 1¼ in. thick.. .. .. „	0	9
Ditto, 2 in. thick .. .. „	0	11
Ditto, 3 in. „ .. .. „	1	4
Diamond paving.		
1¼ in. thick, coped to size from 1 ft. to 2 ft. square.. „	0	9
2 in. ditto.. .. .. „	0	11
2½ in. ditto .. .. „	1	1
If squared and jointed ready for laying, 2*d.* per foot extra.		

PRICES OF STONES—*continued.*

	s.	d.
HOPTON WOOD, DERBYSHIRE LIMESTONE—*continued.*		
Head and flat stones.		
Up to 6 ft. long, 3 in. thick .. .. per ft. sup.	1	6
Ditto 3½ „ .. .. „	1	8
Ditto 4 „ .. .. „	1	10
JACKDAW CRAG, MAGNESIAN LIMESTONE.		
In blocks on trucks at Tadcaster .. .. per ft. cube	0	10
Walling stones .. .. per yd. cube	2	6
KETTON STONE, OOLITE.		
No. 1 coarse stone blocks, 2 ft. cube to 5 ft. long, at quarry .. .. per ft. cube	2	0
Ditto, 2 ft. cube to 8 ft. long .. .. „	3	0
No. 2, best ditto, 2 ft. cube to 4 ft. long .. .. .. „	2	3
Ditto 2 ft. „ 7 ft. „ .. .. .. „	3	6
Ditto 2 ft. „ 8 ft. „ .. .. .. „	4	0
KENTISH RAGSTONE, Delivered alongside Thames at London.		
Hammer-dressed, squared facings, in courses from 4 in. to 10 in. high, as X or Y .. .. per ton	13	0
A ton will cover about 3 yards superficial.		

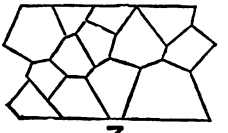


X



Y

Hammer-dressed random facing as Z .. .. per ton	8	6
A ton covers about 4 yards superficial.		



Z

6 in. × 12 in. kerb .. .. per ft. run	1	0
Hammer-dressed angle quoins with drafted angle .. per ft. rise	1/3 to ..	
Rubble rag .. .. per ton	5	0
Hassock, delivered in London .. .. per yd. cube	4	6
Best broken, ditto .. .. „	6	6
Headers, undressed, ditto .. .. per ton	7	0
Ditto, dressed, ditto .. .. „	9	0
Building headers, ditto .. .. „	11/ to 15/	
Gauged ditto, ditto .. .. „	16/ to 18/	

PRICES OF STONES—*continued.*

		s.	d.
MANSFIELD STONE,			
Delivered in full truck loads at St. Pancras Station, London	per foot	2	2
At quarry (on rail)	„	1	6
WALLING STONE, for coursed work.			
In London	per ton	4	0
At quarry (on rail)	„	1	3
Blocks, red or white, from the Mansfield quarries, best quality, random sizes, none of which will exceed 4 ft. in length or 2 ft. in thickness, in London	per ft. cube	1/9 to 3/2	
On rail	„	1/1 to 2/6	
Blocks, selected, large enough to make given sizes, none being more than 7 ft. long, 3 ft. wide, or 2 ft. thick	„	3	6
Blocks, ditto, and up to 3 ft. thick	„	3	9
Ditto 3½ ft. „	„	4	0
Ditto 4 ft. „	„	4	6
Step or landing blocks of white stone, from the lower beds, random sizes, none being over 7 ft. long or 3 ft. wide	„	2	6
Step or landing blocks, selected, large enough to make given sizes, none being over 8 ft. long or 4 ft. wide	„	3	0
Ditto, not over 6 ft. long or 6 ft. wide	„	3	6
Ditto, not over 8 ft. long or 8 ft. wide	„	4	0
Yellow magnesian limestone, from the Mansfield Woodhouse quarries, delivered in London	„	3	6
On rail	„	2	6
Blocks of selected quality, none over 4 ft. long or 1 ft. thick	„	3	6
Blocks not over 5 ft. long	„	4	0
Tomb or gravestone blocks, not over 6 ft. long	„	5	0
Blocks, not over 7 ft. long	„	6	0
Red or white landings, ledgers, and gravestones, sawn both sides, not less than 4 in. thick, and not exceeding 20 ft. super.	„	6	6
Not exceeding 40 ft. super.	„	8	0
„ 60 ft. „	„	9	6
„ 80 ft. „	„	11	0
Red or white stone, sawn to nett dimensions for masons' work, of not less scantling than 12 × 6, or more than 7 ft. long	„	6	6
Yellow magnesian limestone, sawn in like manner	„	9	9
Circular red shafts or columns	per lineal ft.		
Dia. 4 in., 6 in., 8 in., 10 in., 12 in., 15 in., 18 in., 24 in.			

NOTE.—White blocks from the lower beds are thinner and much harder than the best stone, and are chiefly used for sawing into landings and steps, and for heavy foundations where blocks of large surface are required.

PRICES OF STONES—*continued.*

WARWICKSHIRE BLUE LIAS STONE.

	1½ in.	2 in.	3 in.
	s. d.	s. d.	s. d.
In slabs rubbed and laid in mortar per foot super.	1 2	1 4	1 7
In slabs rubbed and laid in 21 in. diagonal squares, laid alternately blue and white ..	1 4	1 6	1 9
Ditto in 21 in. octagons, and 4 in. marble dots	1 6	1 10	2 2

PAINSWICK AND PORTLAND STONE.

Random blocks, in railway trucks, full loads.

	s. d.
Painswick.	
At quarry stations .. .., per ft. cube	1 9
At Paddington, G.W.R., mileage station .. .. .. „	2 2
At Paddington, G.W.R., high level, water-side, including use of crane .. .. „	2 2
At Nine Elms, S.W.R. .. .. „	2 4
At Bricklayers' Arms, S.E.R. .. .. „	2 5
In barge at Brentford Docks .. .. „	2 5
Portland, 20 ft. per block average.	
At quarry stations.. .. .. „	1 10
At Paddington, G.W.R., mileage station .. .. .. „	2 3
At Paddington, G.W.R., high level, water-side, including use of crane .. .. „	2 3
At Nine Elms, S.W.R. .. .. „	2 3
At Bricklayers' Arms, S.E.R. .. .. „	2 4
In barge at Brentford Docks .. .. „	2 4

PORTLAND STONE.

Quarry prices.

Including delivery to ship or rail at Portland.

Block stone, brown, random sizes.					
Averaging* 20 cubic ft. per block .. .. per ft. cube					1 4†
„	24	„	„	.. .. „	1 5
„	28	„	„	.. .. „	1 6
„	32	„	„	.. .. „	1 7
„	36	„	„	.. .. „	1 8
„	40	„	„	.. .. „	1 8
„	48	„	„	.. .. „	1 9
„	56	„	„	.. .. „	1 10
„	64	„	„	.. .. „	1 11
„	72	„	„	.. .. „	2 0
„	80	„	„	.. .. „	2 1

Larger averages (up to the greatest obtainable sizes) at proportionate prices.

* This is the usual average for cargoes and truck loads. Large special blocks may be reduced to this average and price by taking with them same weight in smaller blocks.

† At Nine Elms London Wharf, 2s. 0d.

PRICES OF STONES—*continued.*

PORTLAND STONE—*continued.*		s.	d.
White Portland, for monumental purposes, &c., and blocks of selected quality, more	per ft. cube	0	1
Blocks selected to hold not less than given dimensions, extra	„	0	1
Sawn slabs, random sizes, edges rough.			
1 in.	per ft. super.	0	6½
1¼ in.	„	0	8
2 in.	„	0	9
2½ in.	„	0	11
3 in.	„	1	1
3½ in.	„	1	3
4 in.	„	1	4
5 in.	„	1	6
6 in.	„	1	9
7 in.	„	2	0
8 in.	„	2	3
If exceeding 12 ft. sup. extra	„	0	0½
„ 18 „	„	0	1
„ 24 „	„	0	2
„ 30 „	„	0	3
„ 36 „	„	0	4
„ 42 „	„	0	5
„ 48 „	„	0	6
Outside slabs (if in stock), less than above prices	„	0	2
Headstones, with sawn edges, 2 ft. 6 in. wide, 3 in. thick	„	1	3

Sawn scantlings, random lengths, ends rough.

Thickness.	Width.						
	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.	12 in.
Inches.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
3	0 8	0 9	0 10½	0 11½	1 1	1 2	1 3
4	0 9½	0 11	1 1	0 2	1 3½	1 5	1 6
5	1 0	1 1	1 3	0 5	1 6	1 7	1 8
6	1 1	1 3	1 5	1 7	1 9	1 11	2 0
7	—	1 5	1 7	1 9	1 11	2 2	2 3
8	—	—	1 9	2 0	2 2	2 4	2 6
9	—	—	—	2 2	2 4	2 6	2 9
10	—	—	—	—	2 7	2 9	3 0
11	—	—	—	—	—	3 1	3 4
12	—	—	—	—	—	—	3 6

PRICES OF STONES—*continued.*

	s.	d.
PORTLAND STONE—*continued.*		
Up to 12 in. wide.		
If over 4 feet long, add .. .. per foot run	0	0½
„ 5 „ .. .. „	0	1
„ 6 „ .. .. „	0	1½
„ 7 „ .. .. „	0	2
„ 8 „ .. .. „	0	2½
Spandrel steps, same price as above, measuring rise and tread of mould.		
ROCHE ABBEY, MAGNESIAN LIMESTONE.		
Blocks to dimensions, 7 in. to 16 in. thick, on trucks at Doncaster .. .. per ft. cube	2	0
Random blocks .. .. „	1	9
SEACOMBE, DORSETSHIRE LIMESTONE.		
Blocks at quarry .. .. „	1	4
Blocks at London .. .. „	2	0
STAINTON SANDSTONE.		
Blocks on trucks at quarry .. .. „	1	8
Ditto in London .. .. „	2	6
Blue Whinstone paving sets.		
In trucks at quarry .. .. per ton	14	0
Ditto in London .. .. „	24	0
STANCLIFFE, DERBYSHIRE SANDSTONE.		
Blocks at quarry .. .. per ft. cube	1	6
Ditto, extra large, up to 16 ft. long .. .. .. „	2	6
WARDOUR OR CHILMARK STONE, not exceeding 16 ft. cube.		
Random blocks on rail at Tisbury .. .. per ft. cube	1	3
Ditto at Nine Elms, London .. .. „	1	8
Labour same as Portland for hard bed.		
Ditto on scolt bed, about 10 per cent. more than Bath stone.		
Large or selected blocks, per ft. cube extra, about	0	2

SCOTGATE ASH STONE.

Prices on truck at quarries, Pateley Bridge, Leeds.

PAVING, OR FLAGS.

	Per Yard Superficial.									
	1½ in. to 2 in.		2 in.		2½ in.		3 in.		4 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Self-faced	1	3	1	10	2	8	3	1	3	7
Rough Boasted	—		2	0	2	4	3	7	4	1
Tooled	1	8	2	8	3	6	4	0	4	3
Rubbed	2	8	3	9	4	2	4	4	4	9

PRICES OF STONES—*continued.*

SCOTGATE STONE—*continued.*

Tooled Landings.

	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.
	d.	*d.*	*d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Per ft. Superficial ..	7	8	10	1 0	1 2	1 4

Self-faced Landings, 2*d.* per foot superficial less. Dimension Landings, under 30 feet, 1*d.* per foot extra; and 1*d.* per foot extra for every additional 10 feet above 30. For Rubbed Landings add 3*d.* per superficial foot to Tooled price. For Landings, Tooled two sides, add 5*d.* per superficial foot. Cemetery Headstones or Landings 2*s.* 6*d.* per foot cube. For Superficial Tooling, 2*d.* per foot extra.

	s.	*d.*
Steps and Hewing Work in the Rough .. .. per ft. cube	1	4
Tooled Random Steps, 12 × 6 to 8 at .. .. per ft. lin.	1	1
„ „ 12 × 4 at .. .. „	0	9
„ „ 12 × 3 at .. .. „	0	8
Random Green Craig Blocks .. .. per ft. cube	1	4
„ White „ .. .. „	1	6
„ Scotgate „ (for Cemetery purposes) .. „	2	0
Tooled Edging, 3 in. .. .. per yd. lin.	1	2
„ 4 in. .. .. „	1	5
„ 5 in. .. .. „	1	8
„ 6 in. .. .. „	1	11
Boasted Curbs, 10 × 6 .. .. „	1	9
„ 10 × 7 .. .. „	2	0
„ 10 × 8 .. .. „	2	3
„ 12 × 6 .. .. „	2	2
„ 12 × 8 .. .. „	2	9

Wallstones.

Hammer-dressed.. .. .. per rood of 14 yds.	38	0
Pitch-faced .. .. „	42	0
Insides .. .. „	21	0
„ 5 in. Parpoints .. .. „	22	0

Setts.

6 in. at .. .. „	42	0
8 in. at .. .. „	40	0
8 in. Best at.. .. .. „	46	0
9 in. at .. .. „	48	0
Paviors .. .. per ton	6	6
Tooled 6 in. Sinks .. .. per yd. super.	1	3
Lamb Self Flags .. .. per ft. super.	1	4

CLIPSHAM QUARRIES, OAKHAM, RUTLAND.

This stone may be had in blocks of any portable size, from 1 to 3 feet on bed.

Prices of delivery for random blocks, per 1000 feet:—

	s.	*d.*		*s.*	*d.*
Arsley	1	9	Doncaster..	1	10
Barnet	1	10	Grantham..	1	6
Bawtry	1	9	Finsbury Park..	1	10½
Biggleswade	1	9	Hatfield	1	9
Boston	1	8½	Hornsey	1	10
Bishop Stortford	2	0	Hitchin	1	9
Cambridge	1	7	Huntingdon	1	8
Claypole	1	7	Holme	1	7

PRICES OF STONES—*continued.*

CLIPSHAM QUARRIES—*continued.*

	s.	d.		s.	d.
Hertford	1	9½	Peterborough	1	6½
Holbeach	1	7½	Retford	1	9
Leicester	1	10	Rugby	1	9½
Lincoln	1	8	Southgate	1	10
Lynn	1	9½	Stevenage	1	9
Manchester	2	0	Sandy	1	9
March	1	8	St. Neots	1	8½
Newark	1	7½	St. Albans	1	9½
Northampton	1	7	Spalding	1	7
Nottingham	1	8	Stamford	1	6
Potter's Bar	1	10	St. James Deeping	1	7

Dressed rubble wall stones, per yard super. 3*s.* in trucks.

London Stations.

	s.	d.		s.	d.
King's Cross	1	10½	Blackfriars	2	0½
Poplar Docks	1	11½			

4½ Ashlar, per yard super. at 6*s.* 6½*d.* in trucks at Little Bytham Station, G.N.R.

BLAIR QUARRY, CULROSS, N.B.	At the Quarry. s.	At the Quarry. d.	Shipped Free on Board at Quarry Pier. s.	Shipped Free on Board at Quarry Pier. d.
Ashlar:—				
Common 12 broad, by 5 to 7 thick.	0	7½	0	8
„ 12 „ by 8 to 9 „	0	8	0	8½
„ 12 „ by 9 to 10 „	0	10½	0	11
Rybats, or Corners:—				
Common 12 broad, 6 to 8 hds. 2 ft. lg.	1	3	1	4
Ashlar do. 12 „ 10 to 12 „	1	6	1	7
„ do. 12 „ 12 to 14 „	1	7	1	9
Courses:—				
5 to 7 by 6 to 8 per lineal foot	0	4½	0	5
Jambs:—				
5 inch thick per rising ft.	0	9½	0	10
Jamb Lintels per lineal ft.	0	8	0	8½
Skews:—				
5 inch thick „	0	8	0	8½
Long Stones, or Sills and Lintels:—				
In length 4 ft. 6 × 12 × 6 to 7	0	8	0	9
„ 6 „ × 12 × 7 to 8	0	10	0	10½
„ 8 „ × 12 × 7 to 8	1	0½	1	1
„ 10 „ × 12 × 7 to 8	1	8	1	9
Cornice Copes or Dado, not confined to certain lengths:—				
Containing 6 sup. at 6 thick sup. ft.	0	8	0	9
„ 8 „ 8 „	0	9	0	10½
„ 10 „ 9 to 10 „	0	11	1	0
„ 12 „ 10 to 12 „	1	2	1	5

PRICES OF STONES—*continued.*

BLAIR QUARRY—*continued.*	At the Quarry.	Shipped Free on Board at Quarry Pier.
	s. d.	*s. d.*
Stones, or Columns:—		
es 6 ft. long by 12 × 12 per lin. ft.	1 4	1 5
8 „ by 12 × 12 „	1 8	1 9
10 „ by 12 × 12 „	2 0	2 1
14 „ by 16 × 16 „	2 9	3 10
tones:—		
es at and under 5 cubic feet	1 2	1 3
„ 20 „	2 0	2 1
e Stones:—		
ble Stones .. .. per ton	1 1	1 7
ndation Stones, random size .. .. „	3 1	3 7

WILD CARR STONE.

ruck at Pateley Bridge, viâ Leeds, same prices as Scotgate Ash Stone.

YORKSHIRE STONE.

P. C. in trucks at quarries.

	1½ in. thick.	2½ in. thick.	3 in. thick.
	s. d.	*s. d.*	*s. d.*
Self-faced Flags, per yd.	1 11	3 4	3 9
Tooled Flags „	2 5	4 4	4 6
	2 in.		
Polished .. „	4 10	5 1	5 4

Landings, per foot superficial.

	Average thickness.											
	2½ in.		3 in.		4 in.		5 in.		6 in.		7 in.		8 in.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Self-faced	0	7	0	8	0	11	1	1	1	3	1	5	1	8
Tooled	0	10	0	11	1	1	1	3	1	6	1	8	1	11
Polished	..		1	1½	1	3½	1	6	1	8½	1	11	2	1

Tooled Coping, per lineal yard.

in.	in.	in.	in.	in.	in.	in.
12 × 2	13 × 2	13 × 2½	12 × 2½	12 × 3	13 × 3	18 × 3
s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
2 1 ..	2 2 ..	2 4 ..	2 4 ..	2 6 ..	2 9 ..	3 9

Note.—The above prices for lots of not less than 4 tons.

TOTTERNHOE STONE.

nestone, argillaceous; colour, greenish white; weight, 116 lbs. per foot ; used at restoration of St. Albans Abbey, &c. Price on trucks at ridge, 1*s.* per foot cube, at L. and N.-W. Railway, London, 1*s.* 3*d.* per ube.

PRICES OF STONES—*continued.*

CLIPSHAM QUARRIES—*continued.*

	s.	d.		s.	d.
Hertford	1	9½	Peterborough	1	6½
Holbeach	1	7½	Retford	1	9
Leicester	1	10	Rugby	1	8½
Lincoln	1	8	Southgate	1	10
Lynn	1	9½	Stevenage	1	9
Manchester	2	0	Sandy	1	9
March	1	8	St. Neots	1	8½
Newark	1	7½	St. Albans	1	9½
Northampton	1	7	Spalding	1	7
Nottingham	1	8	Stamford	1	6
Potter's Bar	1	10	St. James Deeping	1	7

Dressed rubble wall stones, per yard super. 8*s.* in trucks.

London Stations.

King's Cross	1	10½	Blackfriars	2	0½
Poplar Docks	1	11½			

4½ Ashlar, per yard super. at 6*s.* 6½*d.* in trucks at Little Bytham Station, G.N.R.

BLAIR QUARRY, CULROSS, N.B.	At the Quarry. s.	At the Quarry. d.	Shipped Free on Board at Quarry Pier. s.	Shipped Free on Board at Quarry Pier. d.
Ashlar:—				
Common 12 broad, by 5 to 7 thick.	0	7½	0	8
„ 12 „ by 8 to 9 „	0	8	0	8½
„ 12 „ by 9 to 10 „	0	10½	0	11
Rybats, or Corners:—				
Common 12 broad, 6 to 8 hds. 2 ft. lg.	1	3	1	4
Ashlar do. 12 „ 10 to 12 „	1	6	1	7
„ do. 12 „ 12 to 14 „	1	7	1	9
Courses:—				
5 to 7 by 6 to 8 per lineal foot	0	4½	0	5
Jambs:—				
5 inch thick per rising ft.	0	9½	0	10
Jamb Lintels per lineal ft.	0	8	0	8½
Skews:—				
5 inch thick „	0	8	0	8½
Long Stones, or Sills and Lintels:—				
In length 4 ft. 6 × 12 × 6 to 7	0	8	0	9
„ 6 „ × 12 × 7 to 8	0	10	0	10½
„ 8 „ × 12 × 7 to 8	1	0½	1	1
„ 10 „ × 12 × 7 to 8	1	8	1	9
Cornice Copes or Dado, not confined to certain lengths:—				
Containing 6 sup. at 6 thick sup. ft.	0	8	0	9
„ 8 „ 8 „	0	9	0	10½
„ 10 „ 9 to 10 „	0	11	1	0
„ 12 „ 10 to 12 „	1	2	1	5

PRICES OF STONES—*continued.*

BLAIR QUARRY—*continued.*	At the Quarry.	Shipped Free on Board at Quarry Pier.
	s. d.	s. d.
Square Stones, or Columns:—		
Stones 6 ft. long by 12 × 12 per lin. ft.	1 4	1 5
„ 8 „ by 12 × 12 „	1 8	1 9
„ 10 „ by 12 × 12 „	2 0	2 1
„ 14 „ by 16 × 16 „	2 9	3 10
Cube Stones:—		
Stones at and under 5 cubic feet	1 2	1 3
„ „ 20 „	2 0	2 1
Rubble Stones:—		
Rubble Stones .. .. per ton	1 1	1 7
Foundation Stones, random size .. .. „	3 1	3 7

WILD CARR STONE.

On truck at Pateley Bridge, viâ Leeds, same prices as Scotgate Ash Stone.

YORKSHIRE STONE.

P. C. in trucks at quarries.

	1½ in. thick.	2½ in. thick.	3 in. thick.
	s. d.	s. d.	s. d.
Self-faced Flags, per yd.	1 11	3 4	3 9
Tooled Flags „	2 5	4 4	4 6
	2 in.		
Polished .. „	4 10	5 1	5 4

Landings, per foot superficial.

	Average thickness.						
	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Self-faced	0 7	0 8	0 11	1 1	1 3	1 5	1 8
Tooled	0 10	0 11	1 1	1 3	1 6	1 8	1 11
Polished	..	1 1½	1 3½	1 6	1 8½	1 11	2 1

Tooled Coping, per lineal yard.

in. × in.	in. × in.	in. × in.	in. × in.	in. × in.	in. × in.	in. × in.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
12 × 2 2 1	13 × 2 2 2	13 × 2½ 2 4	12 × 2½ 2 4	12 × 3 2 6	13 × 3 2 9	18 × 3 3 9

Note.—The above prices for lots of not less than 4 tons.

TOTTERNHOE STONE.

Limestone, argillaceous; colour, greenish white; weight, 116 lbs. per foot cube; used at restoration of St. Albans Abbey, &c. Price on trucks at Stanbridge, 1*s.* per foot cube, at L. and N.-W. Railway, London, 1*s.* 3*d.* per foot cube.

PRICES OF STONES—*continued.*

QUARELLA STONE.

On truck at Bridgend Station, South Wales.
In block, 1*s.* 6*d.* per cube foot. In London, 2*s.* 3*d.*
All LANDINGS priced as sawn both sides; if only sawn one side, 2*d.* per foot less.

	Thickness, in inches.													
	3.		4.		5.		6.		7.		8.		9.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Landings not exceeding 25 ft. sup.	0	10	1	1	1	4	1	6	1	9	1	11	2	1
30 „	0	11	1	2	1	5	1	7	1	10	2	0	2	2
40 „	1	0	1	3	1	6	1	9	2	0	2	2	2	4
50 „	1	2	1	5	1	8	1	11	2	2	2	4	2	6
60 „	1	5	1	8	1	11	2	2	2	6	2	10	3	1
70 „	1	9	2	2	2	7	3	0	3	5	3	10	4	3

SLABS, random sizes, for Hearth Stones, &c.

	Thickness, in inches.									
	1½.		2.		2½.		3.		3½		4.	
Super. Ft.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Sawn both sides	0	5½	0	6½	0	7½	0	9	0	10½	1	0
„ one side	0	4	0	5	0	6	0	7½	0	9	0	10½

	2.		2½.		3.		3½.			
Super. Ft.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*		
Sawn Paving, one side	0	4	0	5	0	6	0	7½		

STEPS, not exceeding 6 ft. long.

	Size, in inches.													
	10 × 6		10 × 7		12 × 6		12 × 7		12 × 8		12 × 9		14 × 6		14 × 7	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Sawn one side ..	1	1	1	3	1	3	1	5	1	7	1	9	1	5	1	7
„ top and edge	1	6	1	8	1	8	1	11	2	2	2	5	1	10	2	1
„ three sides..	1	9	1	11	1	11	2	2	2	5	2	8	2	1	2	4
„ four sides ..	2	0	2	2	2	2	2	5	2	8	3	0	2	4	2	7

	Size, in inches.											
	14 × 8		14 × 9		16 × 6		16 × 7		16 × 8		16 × 9		18 × 6		18 × 7	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Sawn one side ..	1	9	2	0	1	8	1	11	2	2	2	4	1	10	2	1
„ top and edge	2	4	2	8	2	1	2	5	2	9	3	0	2	4	2	8
„ three sides..	2	7	2	11	2	5	2	9	3	1	3	4	2	8	3	0
„ four sides ..	2	10	3	3	2	8	3	0	3	4	3	8	2	11	3	3

STEPS, not exceeding 9 ft., add 2*d.* per ft.

QUARELLA STONE—*continued.*

THIN STEPS or WALL COPING, not exceeding 5 ft.

	Size, in inches.											
	12×2½		12×3		12×4		12×5		14×2½		14×3	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sawn top and edge	0	7	0	8	0	11	1	2	0	8	0	10
„ three sides..	0	9	0	10	1	2	1	5	0	10	1	0
„ four sides ..	0	10	1	0	1	4	1	7	1	2	1	2

	Size, in inches.											
	14×4		14×5		16×2½		16×3		16×4		16×5	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sawn top and edge	1	1	1	3	0	9	0	11	1	3	1	7
„ three sides..	1	3	1	6	0	11	1	2	1	6	1	10
„ four sides ..	1	6	1	9	1	1	1	4	1	9	2	1

	Size, in inches.											
	16×2½		16×3		16×4		16×5		18×2½		18×3	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sawn top and edge	0	10	1	0	1	4	1	8	1	1	1	2
„ three sides..	1	1	1	3	1	8	2	2	1	3	1	5
„ four sides ..	1	4	1	8	2	2	2	7	1	6	1	10

	Size, in inches.											
	18×4		18×5									
	s.	d.	s.	d.								
Sawn top and edge	2	3	2	8								
„ three sides..	2	8	3	2								
„ four sides ..	3	2	3	8								

WINDOW SILLS, not exceeding 5 ft., sawn on the bevel.

	Size, in inches.											
			10×4		10×5		12×3		12×4		12×5	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sawn three sides	1	1	1	3	1	5	1	3	1	5	1	7

PARK SPRING STONE.

P. C. in trucks at quarry.

	Thickness, per foot super.											
	2 in.		2½ in.		3 in.		4 in.		5 in.		6 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Slabs sawn both sides..	0	8½	0	10	0	11¼	1	5	1	8	1	11
Headstones	—		—		1	1	1	6	1	10	2	1

	s.	d.
2 in. to 2½ in. outside slabs .. .. per yd. super.	5	0
2 in. sawn flags .. .. „	4	9
Blocks for monuments .. .. per ft. cube	2	0
„ random .. .. „	1	10
Steps, 12 in. × 6 in., sawn bed and edge .. per ft. run.	1	7
Sinks, 6 in. thick, tooled random sizes .. per ft. super.	1	8

FREESTONE AT ORCHARD, *&c.—continued.*

WHEELING STEPS—each.

Length.	7 Inches Thick.					9 Inches Thick.				
	18^{c}	21^{c}	24^{c}	28^{c}	32^{c}	18^{c}	21^{c}	24^{c}	28^{c}	32^{c}
ft. in.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
3 6	2 11	3 2	3 8	4 1	4 11	3 9	4 2	4 7	5 1	5 11
4 0	3 3	3 8	4 1	4 8	5 7	4 2	4 7	5 2	5 11	6 7
5 0	4 3	4 8	5 6	6 4	7 7	5 1	6 0	6 9	7 8	8 8
6 0	6 1	6 6	7 8	9 1	10 6	7 3	8 2	9 3	10 10	11 11
7 0	8 3	8 9	10 0	11 11	14 1	9 7	10 10	12 7	14 5	15 10
7 6	9 5	10 1	11 9	13 6	16 3	10 10	12 2	14 3	16 7	18 5

LONG STONES—each.

Length.	12–7	12–9	12–11	12–13	14–7	14–9	14–11	14–13	16–7	16–9	16–11	16–13
feet.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
4	3 0	3 10	4 8	5 6	3 6	4 6	5 6	6 6	4 1	5 1	6 4	7 5
4½	3 4	4 3	5 4	6 4	3 11	5 3	6 3	7 5	4 5	5 9	7 0	8 9
5	3 11	4 10	6 2	7 5	4 6	5 10	7 4	8 9	5 3	6 6	8 1	10 3
5½	4 8	5 10	7 3	8 9	5 3	6 10	8 9	10 6	6 4	7 8	9 7	12 1
6	5 9	6 11	8 7	10 6	6 3	8 0	10 6	12 4	7 5	9 0	11 6	14 2
6½	6 9	8 1	10 2	12 4	7 4	9 4	12 4	14 5	8 9	10 7	13 3	17 3
7	7 9	9 4	11 8	14 0	8 6	10 6	13 11	17 0	10 3	12 6	15 4	20 1
7½	8 9	10 7	13 7	16 1	9 8	11 9	15 11	19 7	11 8	14 1	17 10	23 1
8	9 8	11 9	15 6	18 2	11 3	13 8	18 2	22 2	13 3	16 2	20 2	26 4
8½	11 2	13 7	17 8	20 2	12 7	15 9	20 1	24 11	14 9	18 3	22 3	29 0
9	12 1	15 2	19 11	22 9	14 2	17 8	22 10	27 11	16 6	20 6	25 3	32 9
9½	13 6	17 0	22 2	25 3	15 10	19 8	25 3	31 0	18 6	22 9	27 11	36 11
10	14 9	18 11	24 5	27 7	17 5	21 10	27 7	34 2	20 6	25 3	31 1	40 10
10½	16 2	21 0	27 3	30 0	19 1	24 1	30 0	37 5	22 3	27 7	34 2	45 2
11	17 5	23 1	30 3	32 9	21 0	26 3	32 11	41 2	24 5	30 6	37 9	49 9
12	20 9	26 10	35 8	39 10	24 5	31 6	40 1	48 6	28 8	36 6	45 6	58 3

Length.	18–7	18–9	18–11	20–7	20–9	20–11	22–7	22–9	22–11	24–7	24–9	24–11
feet.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
4	4 6	5 9	7 1	5 5	6 5	8 0	5 11	7 1	8 11	6 7	7 10	9 8
4½	5 3	6 6	8 2	6 4	7 3	9 5	7 1	8 1	10 3	7 4	8 11	11 6
5	6 2	7 9	9 6	7 4	8 5	11 0	8 1	9 1	11 8	8 11	10 4	13 4
5½	7 5	8 10	11 3	8 10	10 3	12 9	9 7	10 10	13 9	10 6	11 10	15 11
6	8 10	10 7	12 10	10 6	11 11	14 10	11 7	12 11	16 1	12 7	14 4	18 11
6½	10 6	12 6	15 1	12 4	14 0	17 6	13 8	15 2	18 7	14 11	16 9	22 1
7	12 2	14 3	17 6	14 3	16 1	20 0	15 9	17 6	21 4	17 3	19 3	25 10
7½	13 9	16 5	20 0	16 4	18 7	23 1	17 10	20 2	24 8	19 7	22 4	29 5
8	15 9	18 7	22 3	18 7	21 4	26 3	20 3	23 9	27 11	22 4	26 3	32 10
8½	17 9	21 0	24 10	20 9	24 4	29 4	23 0	27 0	31 6	25 3	30 0	36 6
9	19 8	23 3	27 11	23 1	27 0	32 7	25 5	30 8	35 4	27 11	33 10	40 9
9½	21 7	25 11	31 6	25 5	30 0	35 9	28 4	34 3	39 9	31 1	37 10	45 3
10	23 9	28 8	35 1	27 11	33 5	39 7	31 1	37 10	44 1	34 3	41 8	51 0
10½	25 11	31 8	38 10	30 8	36 9	44 2	34 0	42 0	48 10	37 4	46 3	56 9
11	28 3	34 11	42 9	33 7	40 6	48 3	37 4	46 3	53 9	41 0	51 0	63 0
12	33 9	42 0	52 6	39 10	48 10	59 1	44 4	55 2	65 9	48 11	60 9	74 9

Freestone at Plean Quarry, near Stirling.

Description.	Common Rock. s.	d.	Best Rock. s.	d.	Description.		s.	d.
Rybats, 24 × 12 × 12 each	1	0	1	5	Rubble, large	per ton	1	6
Do. 24 × 12 × 10 „	0	10	1	2	Do. common	„	1	0
Corners, 20 × 12 × 9 „	0	9	1	0	Do. packing	„	0	10
Do. 20 × 12 × 8 „	0	8	0	10	Scuntions	each	0	7
Coursers, 8″ × 8″ per lin. ft.	0	3	0	4½	Founds, common	per ton	2	6
Do. 6″ × 6″ „	0	2½	0	3½	Do. dressed, 8″ thick, per sup. feet		0	5

Jambs, 5″ thick, 5*d*. per sup. foot.

Stones of Random Lengths—under 5 feet long.

	Common Rock. Inches in Thickness.												Best Rock. Inches in Thickness.											
	6		7		8		9		10		11		6		7		8		9		10		11	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Common Ashlar, 12″ high, per lin. ft.	0	5½	0	6	0	7	0	8	0	9	0	10	0	6½	—		—		—		—		—	
Cornice, Cope, &c., per sup. ft.	0	6	0	7	0	8	0	9	0	10	1	0	0	8	0	9	0	10	0	11	1	1	1	3

Long Stones.

	Common Rock. Inches in Thickness.												Best Rock. Inches in Thickness.											
	6		7		8		9		10		11		6		7		8		9		10		11	
Per sup. ft.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Under 5 ft. long ..	—		0	8	0	9	0	11	1	0	1	2	—		0	10	0	11	1	1	1	2	1	3
„ 5 ft. 6 in. long	—		0	9	0	10	1	0	1	1	1	3	—		1	0	1	1	1	2	1	3	1	6
„ 6 ft. long ..	—		0	10	0	11	1	1	1	2	1	4	—		1	1	1	2	1	4	1	6	1	7
„ 7 „ ..	—		1	0	1	1	1	3	1	6	1	9	—		1	3	1	5	1	7	1	9	1	11
„ 8 „ ..	—		1	2	1	4	1	6	1	9	2	0	—		1	5	1	8	1	10	2	0	2	3
„ 9 „ ..	—		—		1	6	1	9	2	0	2	6	—		—		2	0	2	2	2	3	2	8
„ 10 „ ..	—		—		1	9	2	0	2	6	2	9	—		—		2	4	2	8	2	9	3	0

Cube Stones.

Under feet cube ..	5		10		15		20		25		30		5		10		15		20		25		30	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Under 5 feet long ..	0	10	1	0	1	2	1	4	1	8	2	3	1	3	1	4	1	5	1	8	2	0	2	6
„ 6 „ ..	—		1	2	1	4	1	6	2	0	2	6	—		1	8	1	10	2	1	2	3	2	9
„ 7 „ ..	—		1	3	1	6	1	9	2	2	2	9	—		2	0	2	2	2	5	2	6	3	0
„ 8 „ ..	—		1	6	1	9	2	1	2	6	3	0	—		2	3	2	6	2	9	3	0	3	6
„ 9 „ ..	—		1	10	2	0	2	2	2	8	3	3	—		2	8	2	10	3	2	3	5	3	11
„ 10 „ ..	—		2	2	2	4	2	6	3	0	3	6	—		3	0	3	3	3	6	3	9	4	4

FREESTONE FROM POLMAISE QUARRY, NEAR BANNOCKBURN.

	s.	d.		White Rock. s.	White Rock. d.	Brown Rock. s.	Brown Rock. d.
Rubble, large, per ton	1	6	Rybats, 24 × 12 × 10 each	1	0	1	2
Ditto, common „	1	2	Ditto, 24 × 12 × 12 „	1	2	1	5
Founds, common, „	2	6	Scuntions .. .. .. „	0	7	—	
Do., square dressed, 12 in. thick and under, p. sq. ft.	0	5	Jambs 5 in. thick, per sup. ft. „	0	5	—	

STONES OF RANDOM LENGTHS—not confined to any length under 5 feet.

	White Rock. Inches in Thickness.						Brown Rock. Inches in Thickness.					
	6	7	8	9	10	11	6	7	8	9	10	11
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Ashlar, common, 12 in. high, per lin. ft.	0 5½	—	—	—	—	—	0 6½	—	—	—	—	—
Coursers, 6 in. on the bed	0 2½	—	0 3½	—	—	—	0 3½	—	0 4	—	—	—
Cornices, cope, &c., not exceeding 20 in. broad, per sup. ft.	0 7	0 8	0 9	0 10	1 0	1 2	0 8	0 9	0 10	0 11	1 1	1 3
Ditto, ditto, above 20 in. broad will be charged 2d. per sup. ft. additional.												

STONES OF PARTICULAR SIZES—Length, Breadth, and Thickness specified.
NOTE.—Stones above 24 inches broad will be charged at 2d. per superficial foot additional.

	White Rock. Inches in Thickness.						Brown Rock. Inches in Thickness.					
	6	7	8	9	10	11	6	7	8	9	10	11
Per sup. ft.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Not exceeding 5 ft. long	—	0 8	0 9	0 10	1 0	1 2	—	0 10	0 11	1 1	1 2	1 3
Do. 6 do.	—	0 10	0 11	1 0	1 2	1 4	—	1 0	1 2	1 4	1 6	1 7
Do. 7 do.	—	1 1	1 2	1 3	1 4	1 6	—	1 3	1 5	1 7	1 9	1 11
Do. 8 do.	—	1 3	1 4	1 5	1 6	1 8	—	1 5	1 8	1 10	2 0	2 3
Do. 9 do.	—	—	1 7	1 8	1 9	2 0	—	—	2 0	2 2	2 3	2 6
Do. 10 do.	—	—	2 0	2 0	2 2	2 4	—	—	2 4	2 8	2 9	3 0

CUBE STONES.

Not exceeding cube ft.			15	20	25	30		10	15	20	25	30
Per cubic ft.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Not exceeding 5 ft. long	—	—	1 2	1 3	1 6	1 9	—	1 3	1 5	1 8	2 0	2 6
Do. 6 do.	—	—	1 4	1 5	1 8	2 0	—	1 8	1 10	2 1	2 3	2 9
Do. 7 do.	—	—	1 5	1 8	2 0	2 4	—	2 0	2 2	2 5	2 6	3 0
Do. 8 do.	—	—	1 9	2 0	2 4	2 8	—	2 3	2 6	2 9	3 0	3 6
Do. 9 do.	—	—	2 0	2 4	2 9	3 0	—	2 8	2 10	3 0	3 3	3 11
Do. 10 do.	—	—	2 6	2 9	3 3	3 6	—	3 0	3 3	3 6	3 9	4 4

STONE FROM HERMAND QUARRY, BY WEST CALDER.

STONES OF RANDOM LENGTHS (but not exceeding 5 ft. long and 20 in. broad).

	Common Rock. Thickness in Inches.					Best Rock. Thickness in Inches.				
	6	8	10	12	14	6	8	10	12	14
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Ashlar, per lin. ft., 12 in. high	0 5½	—	—	—	—	0 6½	—	—	—	—
Cornice or Cope, per sup. ft.	0 5½	0 7	0 9	1 0	1 0	0 6½	0 9	0 11	1 0	1 2

When over 20 in. broad, the above will be charged 2*d.* per sup. foot additional.

	per ton. s. d.		Com. Rock. s. d.	Best Rock. s. d.		Common Rock. s. d.
Rubble	1 6	Rybats, 24 × 12 & 10 in. heads, each	0 10	1 0	Jambs, 5 in. thick, per sup. ft. ..	0 5
Founds, common	2 0	Do., 12 × 12 × 12 each	1 0	1 3	Do., 6 in. do. ..	0 6½
Do., 7–8 in. thick, per sup. ft. ..	0 6	Scuntions do.	0 8	—	Random Blocks, per cub. ft. ..	1 0

STONES OF PARTICULAR SIZES, but under 24 in. broad (dimensions each way specified); if over 24 in. broad, 2*d.* per sup. foot will be added.

	Common Rock. Thickness in Inches.					Best Rock. Thickness in Inches.				
Per sup. ft.	7	8	9	10	11	7	8	9	10	11
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Under 5 ft. long	0 7	0 8	0 9	0 10	0 11	0 8	0 9	0 10	0 11	1 0
„ 6 „	0 8	0 9	0 10	0 11	1 0	0 10	0 11	1 0	1 1	1 2
„ 8 „	0 10	1 0	1 1	1 2	1 3	1 0	1 2	1 4	1 5	1 6
„ 10 „	—	1 5	1 7	1 9	1 11	—	1 7	1 10	2 1	2 4
„ 12 „	—		2 2	2 5	2 9	—	—	2 5	2 9	3 4

CUBE STONES OF PARTICULAR SIZES.

	Common Rock.							
Not exceeding cub. ft.	15	20	25	30	35	40	45	50
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Under 5 ft. long, per cub. ft.	0 10	1 0	1 2	1 5	1 7	1 10	2 2	2 6
„ 6 „	0 11	1 2	1 4	1 7	1 10	2 1	2 5	2 11
„ 8 „	1 3	1 6	1 8	1 11	2 3	2 8	3 0	3 7
„ 10 „	1 11	2 1	2 4	2 7	3 0	3 4	3 8	4 0
„ 12 „	2 10	3 1	3 4	3 7	3 9	4 0	4 4	4 8

STONE FROM HERMAND QUARRY—*continued.*

CUBE STONES OF PARTICULAR SIZES.

Not exceeding cub. ft.	Best Rock.															
	15		20		25		30		35		40		45		50		60	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Under 5 ft. long, per cub. ft.	1	0	1	3	1	5	1	8	1	11	2	3	2	7	3	0	4	0
„ 6 „	1	2	1	4	1	6	1	10	2	2	2	6	2	10	3	4	4	3
„ 8 „	1	6	1	8	1	11	2	3	2	7	3	0	3	5	4	0	4	8
„ 10 „	2	3	2	5	2	8	3	0	3	4	3	9	4	1	4	5	5	2
„ 12 „	3	4	3	6	3	8	3	11	4	2	4	5	4	8	5	0	5	9

FREESTONE AT RAVENSCRAIG QUARRY, Dalry, Ayrshire.

	s.	d.
Ashlar .. .. per lin. ft.	0	6
Ch. Ashlar .. .. „	0	5
Scuntions .. .. each	0	7
Backs .. .. „	0	6
Coursers .. .. per lin. ft.	0	3
Rybets .. .. each	1	4
Jambs, 3 0 × 18 × 5 .. .. „	1	6
Do. 3 6 × 18 × 5 .. .. „	1	10
Do. 4 0 × 18 × 6 .. .. „	3	0
Pavement .. .. per sq. ft.	0	4

LONG STONES—each.

Length.	12–7		12–9		12–11		14–7		14–9		14–11		16–7		16–9		16–11		18–7		18–9	
feet	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
4	2	8	3	5	4	2	3	1	4	0	4	11	3	8	4	6	5	8	4	0	5	1
4½	3	0	3	10	4	10	3	6	4	8	5	7	4	0	5	1	6	3	4	8	5	10
5	3	6	4	4	5	7	4	1	5	3	6	7	4	9	5	10	7	3	5	7	7	0
5½	4	3	5	3	6	6	4	9	6	2	7	11	5	9	6	11	8	8	6	8	8	2
6	5	2	6	3	7	9	5	8	7	3	9	6	6	8	8	1	10	4	8	0	9	6

BROAD STONES—per sup. foot.

Under	6 in.		8 in.		10 in.		12 in.		Under
feet.	s.	d.	s.	d.	s.	d.	s.	d.	feet.
6	0	7	0	9½	0	11½	1	1	6
10	0	8½	0	11	1	0½	1	3	10
14	0	10½	1	0½	1	2½	1	5	14
18	1	0½	1	3	1	5	1	8	18
22	1	4	1	7	1	9	2	0	22

CUBE STONES—per cubic foot.

NOTE.—Length not to exceed twice the breadth, nor breadth twice the thickness.

	s.	d.		s.	d.
Under 15 feet	1	0	Under 40 feet	2	1
„ 20 „	1	2	„ 45 „	2	4
„ 25 „	1	4	„ 50 „	2	9
„ 30 „	1	7	„ 55 „	3	2
„ 35 „	1	10	„ 60 „	3	8

1s. per cart charged for putting on trucks.

WHITSOM-NEWTON STONE, Berwickshire.

Free on Trucks at Edrom Station.

		s.	d.
Coursers, from 6 in. to 9 in. high	per sup. yd.	3	6
Corners and Rybats, up to 1 ft. 6 in. long and 6 in. on head	per rising ft.	0	8½
Ditto, „ 1 „ 9 „ „ 7 „ „	„	0	9½
Ditto, „ 1 „ 9 „ „ 9 „ „	„	0	10½
Ditto, „ 2 „ „ 9 „ „	„	1	0
Ditto, „ 2 „ „ 12 „ „	„	1	2
LINEAL MEASURE.			
Long Stones, up to 5 ft. long, and 12 in. × 6 in.	per lin. ft.	0	8½
Ditto, „ 5 „ „ 12 „ × 8 „	„	0	10
Ditto, „ 5 „ „ 12 „ × 10 „	„	1	0
For every additional part of 1 ft. in lengths up to 9 ft. long	per ft. extra	0	1
Ditto, above 9 ft. long	„	0	2
Ordinary Ashlar, random lengths up to 12 in. × 6 in. ..	per lin. ft.	0	8½
Ditto „ „ „ „ 12 „ × 8 „ ..	„	0	9½
Ditto „ „ „ „ 12 „ × 12 „ ..	„	1	0
Ditto „ „ „ „ 12 „ × 13 „ ..	„	1	2
Coping, angular, or half-round, random lengths and up to 14 in. × 7 in.	„	0	9½
Ditto „ „ „ 16 „ × 8 „	„	1	1
Ditto „ „ „ 18 „ × 9 „	„	1	3
SUPERFICIAL MEASURE.			
Stones, up to 5 ft. long, and from 1 ft. to 2 ft. broad and 7 in. thk.	per sup. ft.	0	9½
Ditto „ „ „ 2 „ 8 „	„	0	10½
Ditto „ „ „ 2 „ 9 „	„	0	11½
Ditto „ „ „ 2 „ 10 „	„	1	0½
Ditto „ „ „ 2 „ 11 „	„	1	2
For every additional or part of 6 in. in width	per ft. extra	0	1
For „ „ 1 ft. in length	„	0	1
Common Head Stones, on the above prices..	„		—
Flat Coping Chimney Stones, and Skew random lengths, up to 15 in. × 4 in.	per sup. ft.	0	7
Ditto ditto „ 15 „ × 6 „	„	0	8
CUBE STONE.			
Random Blocks, not exceeding 10 cub. ft. and up to 5 ft. long	per cub. ft.	1	0
Ditto „ above 10 ft. & not exceeding 20 ft.	„	1	3
Ditto „ „ 20 „ „ 30 „	„		—
Ditto „ „ 30 „ „ 40 „	„		—
Ditto „ „ 40 „ „ 50 „	„		—
Ditto „ „ 50 „ „ 60 „	„		—
If cut to two special sizes	per ft. extra	0	1
If cut to three „ or full	„	0	2
For every additional or part of 1 ft. in length	„		—

Chapelhall Pavement.

	In Quarry.	In Glasgow Depot.
	s. d.	s. d.
2 in. or 2½ in.		
Under 10 ft., rough	0 5	0 6
planed	0 6	0 7
„ 15 ft., rough	0 5½	0 6½
planed	0 7	0 8
3 in.		
Under 10 ft., rough	0 5½	0 6½
planed	0 7	0 8
„ 15 ft., rough	0 6½	0 7½
planed	0 8	0 9
4 in.		
Under 10 ft., rough	0 8	0 9
planed	0 10	0 11
„ 15 ft., rough	0 10	0 11
planed	1 0	1 1
Back hearths .. .. .. per sup. ft.	0 3	0 3
Bissing stones .. .. .. „	0 11	—
Rubble .. .. per cart	2 0	—

Craigleith Stone.

Prices and Terms—in Block (up to 10 feet long or 5 feet wide).

	s.	d.
Stones up to 5 feet cube—per cubic foot	4	3
„ of 5 „ and under 10 feet cube ..	4	9
„ „ 10 „ „ 15 „ ..	5	3
„ „ 15 „ „ 20 „ ..	5	9
„ „ 20 „ „ 25 „ ..	6	3
„ „ 25 „ „ 30 „ ..	6	9
„ „ 30 „ „ 35 „ ..	7	3
„ „ 35 „ „ 40 „ ..	7	9
„ „ 40 „ „ 45 „ ..	8	3
„ „ 45 „ „ 50 „ ..	8	9
„ „ 50 „ „ 55 „ ..	9	3
„ „ 55 „ „ 60 „ ..	9	9

Larger, longer, or wider stones than above at special prices.

Kilkenny Marble Mills.

Prices free on Rail at Kilkenny of Marble Column-Shafts to the Trade, at per Lineal Foot.

Diameter.	Dark Grey Marble. Fine Sanded.			Dark Grey Marble. Polished.			Kilkenny Marble. Polished.			Victoria Red Marble. Polished.			Pure Black Marble. Polished.			Connemara Green Marble. Polished.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
4 in. (& under)	0	3	9	0	5	0	0	5	6	0	5	9	0	6	6	0	9	6
5 „	0	4	3	0	5	6	0	6	6	0	6	9	0	7	6	0	11	6
6 „	0	4	9	0	6	6	0	7	6	0	7	9	0	9	0	0	14	0
7 „	0	5	6	0	7	6	0	9	0	0	9	3	0	10	6	0	16	6
8 „	0	6	6	0	9	0	0	10	6	0	11	0	0	12	0	0	19	0
9 „	0	7	6	0	10	6	0	12	0	0	13	0	0	14	0	1	3	0
10 „	0	9	0	0	12	0	0	14	0	0	15	0	0	16	6	1	7	0
11 „	0	10	6	0	13	6	0	16	0	0	17	0	0	19	0	1	11	0
12 „	0	12	0	0	15	0	0	18	0	0	19	0	1	1	6	1	15	0
14 „	0	14	6	0	18	0	1	2	0	1	3	0	1	4	0	2	3	0

The above prices are for ordinary lengths. Special quotations for extra lengths, or for columns of larger diameter than those priced. Estimates given for shaped and clustered columns, fonts, pedestals, &c.

Prices of Irish Marble Slabs and Scantlings, at per Superficial Foot.

Thickness.	Kilkenny Marble.		Pure Black Marble.		Victoria Red Marble.		Green Marble.		Dark Grey Marble.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
¾ inch	1	1	1	3	1	2	2	6	0	8
1 „	1	4	1	7	1	5	2	9	0	10
1¼ „	1	8	1	11	1	9	3	6	1	0
1½ „	1	10	2	2	2	0	4	0	1	2
2 „	2	3	2	7	2	5	4	6	1	6
2½ „	2	9	3	3	3	0	5	0	1	9
3 „	3	3	3	9	3	6	5	6	2	0
4 „	4	3	5	0	4	6	6	9	2	6
5 „	5	3	6	0	5	6	8	0	3	0
6 „	6	0	7	0	6	6	9	0	3	6

Marble, in Block.

	Per Foot Cube.								Per Foot Cube.					
	£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.
Amber	1	3	0	to	1	15	0	Kilkenny	0	18	0	„	1	6	0
Bardilla	1	0	0	„	1	10	0	Rouge Royal ..	1	0	0	„	1	10	0
Black spotless ..	1	10	0	„	2	10	0	Serpentine	1	4	0	„	1	14	0
„ and gold ..	2	0	0	„	3	0	0	Sicilian	0	9	0	„	0	16	0
Brocatella	1	1	0	„	1	15	0	Sienna	3	0	0	„	4	0	0
Dove	0	15	0	„	1	5	0	Statuary	2	12	0	„	4	10	0
Emperor's red and San Juan	1	2	0	„	1	9	0	Veined	0	15	0	„	1	10	0
								Verd antique ..	2	0	0	„	3	0	0

Irish Marbles in Block.

	Per Foot Cube.						Per Foot Cube.					
	s.	d.		s.	d.		s.	d.		s.	d.	
Cork Red	15	0	to	25	0	Dove	15	0	„	20	0	
Midleton	15	0	„	35	0	Black	17	0	„	30	0	
Moneen	15	0	„	25	0	Green (Galway)	25	0	„	60	0	
Fossil	10	0	„	12	0							

Devonshire Marble.

In railway trucks at Plymouth.

	s.	d.
Blocks under 3 feet long .. .. .. per foot cube	4	8
„ 4 „ .. .. „	5	10
„ 6 „ .. .. „	7	0
Over 6 feet, special prices.		
Columns.		
2 in. diameter up to 2 ft. long .. per foot run	7	0
3 „ „ 3 „ .. „	7	7
4 „ „ 4 „ .. „	8	9
5 „ „ 5 „ .. „	9	11
6 „ „ 6 „ .. „	11	8
8 „ „ 6 „ .. „	15	2
10 „ „ 6 „ .. „	17	6
12 „ „ 6 „ .. „	24	6
Over 6 ft. long and 12 in. diam., special prices.		
4 in. wide × 6 in. thick .. .. .. per foot run	4	8
6 „ × 6 „ .. .. .. „	7	0
8 „ × 6 „ .. .. .. „	8	2
10 „ × 6 „ .. .. .. „	10	6
12 „ × 6 „ .. .. .. „	11	1
14 „ × 6 „ .. .. .. „	12	3
16 „ × 6 „ .. .. .. „	13	5
18 „ × 6 „ .. .. .. „	16	4
20 „ × 6 „ .. .. .. „	18	8

MARBLE SLABS, POLISHED AND SET.

	Per Foot Superficial.							
	¾-inch.		1-inch.		1¼-inch.		1½-inch.	
	s.	d.	s.	d.	s.	d.	s.	d.
Veined	5	6	6	0	6	6	7	0
St. Ann's or Dove	6	0	6	6	7	0	7	6
Bardilla	6	3	6	9	7	3	7	9
Kilkenny	7	0	7	6	8	0	9	0
Black	7	6	8	3	8	9	9	3
Black and gold	10	6	12	6	14	0	15	6
Sienna or statuary	14	0	16	0	18	0	20	0

BRABY'S MARBLE PAVINGS.
Fixed in London.

	Per yard Super.	
	s.	d.
Sicilian and black dots	18	6
„ „ rouge „	20	0
„ „ black squares	15	6
„ „ rouge „	18	6

Square, 9 in. × 9 in. and upwards.

Solid Sicilian Spandril Steps, 12 in. × 6 in., gritted on face, per foot lineal, 10s. 6d.

MARBLE. LABOUR, &c.

	Per Foot Run.			
	Vein or Statuary.		Dove and other marbles.	
	s.	d.	s.	d.
Single beads or hollows	1	1	1	3
Double reeded edges	1	9	2	0
Treble „	2	3	2	6
Half-inch flutes	1	1	1	4
Three-quarter inch flutes	1	5	1	8
Inch flutes	1	7	1	11
Ovolo to edge of shelf	1	6	1	9
Back joint	0	4	0	5
Rebated joint	0	5	0	6
Sunk rebate	0	10	1	0
Plain work and polishing to edges	0	5½	0	7
1 in. polished edge	0	7	0	9
1½ „	0	8½	0	10½
2 „	0	11	1	1
	each.			
Plain rounded corners	1	1	1	3
Reeded „	1	6	1	9
Moulded „	2	0	2	6
Notches	0	10	1	0
Copper cramps and fixing	0	9	0	9
Sunk letters per inch in height	0	1½	0	2

Labour on Marble,

	Per Foot Superficial.											
	Vein or Statuary.		Dove.		Bardilla.		Black or Kilkenny.		Black and Gold.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sawing plain work, polished and set	3	6	4	0	4	6	4	9	5	3
Ditto sunk ditto, ditto	7	6	8	6	10	0	10	9	11	3
Ditto moulded ditto, ditto	10	0	11	0	12	6	13	0	14	0
Ditto circular plain work	6	0	7	0	8	6	9	0	10	0
Ditto ditto sunk ditto	12	9	14	0	16	0	18	0	19	6
Ditto ditto moulded ditto	15	0	17	9	19	0	20	0	22	0

Plain work only, not polished, one-third less.

Szerelmey Stone Liquid,

For Waterproofing and Case-hardening Stone.

Transparent, 5 gallon drums, 32*s.* 6*d.* each.
" 1 " " 7*s.* 6*d.* "

About one gallon required to every 25 sq. yds.; three coats.
Stone paste for modification of colour—grey, brown or red, 25*s.* per cwt.
One pound of paste to each gallon of stone liquid.

Galvanized Iron Cramps.

	Cramps.		Set in with			
			Cement.		Lead.	
	s.	d.	s.	d.	s.	d.
Coping cramps .. .. each	0	3	0	7	0	9
6-in. " .. .. "	0	4	0	8	0	10
8 " " .. .. "	0	6	0	10	1	1
10 " " .. .. "	0	8	1	1	1	4
12 " " .. .. "	0	10	1	4	1	9
Copper " .. per lb.	1	6	2	4	2	10

Time and Materials.

		s. d.
Mason	per hour	0 10½
" fixer	"	0 11½
Carver	"	1*s.* 3*d.* to 1*s.* 6*d.*
Polisher	"	0 8½
Labourer	"	0 7
Mortar	per hod	0 7
Plaster	per bag	1 0
" fine	"	1 2
Roman cement	per bushel	2 0
Portland "	"	2 6
Sand	"	0 6

Terra-cotta.

The price of terra-cotta varies according to the quantity that can be cast from one mould. The greater the quantity of one article, the cheaper the work. The following prices may be taken as a guide:—

Red Terra-cotta.

(Exclusive of Fixing and Filling in.)

	Each.	Per Foot Run.
	s. *d.*	*s.* *d.*
Coping, saddle-back, 10 in. × 10 in. ..	—	3 0
Mitres to ditto, extra	2 0	—
Moulded string, 12 in. × 6 in.	—	2 6
Cornice moulded, 24 in. × 12 in	—	7 0
Mitres to ditto, extra	3 6	—
Open ornamental parapet, 22 in. × 22 in. and 4½ in. thick	—	5 0
Gargoyles, 3 ft. × 1 ft. × 1 ft.	50 0	—
Balls for finials, 2 ft. 9 in. × 1 ft. 6 in.	26 0	—

40 per cent. should be added to the above prices for fixing and builder's profits.

Buff Terra-cotta.

	Each.	Per Foot Run.
	s. *d.*	*s.* *d.*
Keys, ornamented, 7½ in. × 22 in. ..	3 6	—
Springers „ 9 in. × 21 in. ..	3 6	—
Window arch, 5 parts, 3 ft. 6 in. opening	12 6	—
Medallion, 13 in. disc.	5 0	—
Open parapet, block and coping, 26 in. high	—	7 6
Open parapet, block and coping, 18 in. high	—	4 3
Spandril window head, semi, 3 ft. × 1 ft. 6 in.	35 0	—
Trusses, 18 in. deep, 5 face	8 6	—
„ 30 in. × 12 in.	25 0	—
Circular balusters, 20 in. × 5 in. ..	3 4	—
„ „ 15 in. × 6 in. ..	3 0	—
Ball terminals, 39 in. high	21 0	—
„ „ 21 in. „	10 0	—
9 in. ornamental string-course	—	2 6
Chimney partitions	3*s.* to 4*s.*	—
Wall coping, 12 in. × 4 in	—	1 0
„ „ 18 in. × 4 in.	—	1 10

Burmantofts, Leeds, Faience.

For Interior and Exterior Decoration; can be worked out in any Design and variety of Colour.

Prices, delivered on trucks at Leeds.

Tiles.		
For Dados, Fireplaces, Spandrils, String-courses, Cornices, &c.		
3 in. tiles to designs	per ft. square	4/0 to 5/0
4½ in. „	„	3/8 „ 4/6
6 in. „	„	3/0 „ 4/0
The above quotations are subject to modification according to the quantity required.		
Mouldings.		
2 in. mouldings to designs	per ft. lineal	1 0
3 in. „	„	1 3
4½ in. „	„	1 6
6 in. „	„	2 0
9 in. „	„	4 0
Angles as double length.		
Bricks.		
For String-courses, Panels, Fireplaces, &c., &c.		
9 × 3 × 3 in.	each	1 0
3 × 3 × 3 in.	„	0 6

Cornish Granite.—Quarry Prices.

		s.	d.
Scappled granite, in random sizes, from 8 ft. to 40 ft. cube..	per ft. cube	2	6
Ditto to fixed dimensions, 8 ft. to 40 ft. cube	„	3	0
Extra for each additional 10 ft. cube per block	„	0	2
On ship-board in London:			
Plain face, finely axed	per ft. super.	2	6
Ditto, once axed	„	2	0
Plain beds and joints	„	1	6
Sunk work, extra, from	„	1	0
Moulded work		3	9

Granite.	Aberdeen, per ft. cub.	Cornish, per ft. cub.
	s. d.	s. d.
In block, including hoisting and setting	6 6	5 9
	per ft. sup.	
Plain face, finely axed	3 0	2 6
„ roughly „	2 6	2 0
„ to beds and joints	2 0	1 6
Sunk work, rough	2 8	2 2
„ faced	4 0	3 6
Moulded work..	4 6	4 0
„ (circular)	5 3	4 6
Paving, 5 in. thick, laid straight ..	2 10	2 6

Red Aberdeen Granite.

	s.	d.
In blocks, 35 ft. cube .. .. per ft. cube	10	0
„ 27 „ .. .. „	8	9
„ 24 „ .. .. „	8	4
„ 19 to 21 ft. cube .. .. „	7	8
„ 17 „ 19 „ .. .. „	8	0
„ 15 „ 17 „ .. .. „	7	9
„ 13 „ 15 „ .. .. „	6	10
„ 11 „ 13 „ .. .. „	6	4
Extra for fine axing .. .. per ft. supl.	2	11
„ working moulding 6 in. girth .. .. per ft. lin.	3	2
„ „ „ 12 in. „ .. .. „	5	3
Fine axed and moulded square balusters, 8 × 8 × 24 in. high each	61	0
Fine axed and moulded square balusters, 8 × 8 × 21 in. high „	55	0
Fine axed and moulded square balusters, 8 × 8 × 18 in. high „	52	0
Red granite in pilasters, 9 to 11 ft. cube .. .. per ft. cube	6	4
Polishing ditto .. .. per ft. supl.	5	7
Red granite polished and tapered pilasters, girth about 3 ft. 3 in., exposed .. .. each	325	0
Red granite polished and tapered pilasters, girth about 2 ft., exposed .. .. „	265	0
Red granite polished and tapered pilasters, 8 × 8 in. and 10 ft. 3 in. long .. .. „	135	0
Red granite polished tapered columns, 16 in. diam. and 10 ft. 3 in. long .. .. „	367	0
Grey granite landings, in sizes about 22 ft. supl. .. .. .. per ft. supl.	7	9
15 × 6 in. grey granite steps, 7 ft. long .. .. each	103	0
„ „ „ 4 ft. long .. .. „	54	0

Belgian Granite.

In Block, cut to size, 3s. per cubic foot.

Slabs Sawn.

	s.	d.		s.	d.
¾ in. thick ..	0	8 per sq. ft.	4 in. thick ..	1	8 per sq. ft.
1¼ „ „ ..	0	9 „	5 „ „ ..	2	0 „
1½ „ „ ..	0	10 „	6 „ „ ..	2	3 „
2 „ „ ..	1	0 „	7 „ „ ..	2	8 „
2½ „ „ ..	1	1 „	8 „ „ ..	2	10 „
2¾ „ „ ..	1	2 „	10½ „ „ ..	3	8 „
3 „ „ ..	1	4 „	12 „ „ ..	4	2 „

Columns Polished—per foot run.

	s.	d.		s.	d.
3 in. diameter	3	3	9 in. diameter	7	8
4 „ „	4	2	12 „ „	12	6
5 „ „	5	0	16 „ „	16	0
6 „ „	5	8	20 „ „	23	0
7 „ „	6	6	25 „ „	32	0

Above prices are free on quay at Brussels: packing 10 per cent. extra. The freight from Brussels to London would be 14s. and 15 per cent. per ton. A cubic foot weighs about 160 lbs. = 14 ft. per ton.

TAMAR AND KIT HILL GRANITE. Gunnislake, Cornwall.

Edge Kerb.	s.	d.	Flat Kerb.	s.	d.
5 in. × 10 in., per lineal ft.	1	0½	8 in. × 6 in., per lineal ft.	0	10½
6 „ × 10 „ „	1	1	12 „ × 8 „ „	1	5½
5 „ × 12 „ „	1	1	12 „ × 6 „ „	1	4
6 „ × 12 „ „	1	2			

F.O.B in the Thames below Bridge.

Approximate Prices of Columns in RED, BLUE, OR GREY GRANITE, POLISHED.

(Conveyed to London.)

		s.	d.	
3-inch diameter	.. ..	10	0	per lineal foot.
4 „ „	.. ..	12	0	„
5 „ „	.. ..	12	0	„
6 „ „	.. ..	12	0	„
7 „ „	.. ..	14	0	„
8 „ „	.. ..	14	0	„
9 „ „	.. ..	14	0	„
10 „ „	.. ..	17	0	„
11 „ „	.. ..	20	0	„
12 „ „	.. ..	22	0	„
14 „ „	.. ..	25	0	„
15 „ „	.. ..	28	0	„

In moderate lengths.

French Building Stone.

1s. 7½d. per cubic foot; used at 93, Fore Street, E.C. Tercé, Chauvigny, Chateau Gaillard.

PAVIOR.

	Thickness.							
	5 in.		7 in.		8 in.		9 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
	per yd. super.							
Aberdeen granite paving in parallel courses, 5 in. wide	10	0	12	6	14	6	15	6
Ditto, in 3-in. courses	15	6	18	6	21	0	23	0
Taking up old paving and relaying, including gravel and making ground	1	2	1	3	1	5	1	7

	s.	d.
	per yd. sup.	
Grouting granite paving	0	7
Concrete foundation, 6 in. thick	1	6
	per ft. run.	
12 × 6 granite curb	2	6
12 × 8 „ „	2	9
7 × 5 „ channel	1	3
	per ton.	
Broken granite to pass through 1½-in. sieve ..	20	0

Time and Material.

	s.	d.
Pavior .. .. per hour	0	10½
Labourer .. .. „	0	8
Navvy .. .. „	0	8½
„ working in water .. .. .. „	0	9½
Pebbles .. .. per ton	15	6
Aberdeen granite .. .. „	30	0
Purbeck squares .. .. „	30	0
Clay .. .. per yd. cube	6	6
Red pit gravel .. .. „	9	6
Gravel, unscreened .. .. „	6	0
„ coarse screened ballast .. „	7	0
„ fine .. .. „	7	6
Carting rubbish .. .. per load	3	6
One horse, cart, and man .. .. .. per day	12	6

Tar Pavement.

Thickness	3 in.		4 in.		6 in.		9 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Price.. .. .. per yd. super.	2	6	3	6	4	3	5	3

HOBMAN'S TAR PAVING.

	per yard sup. s.	d.
Machine-made limestone tar paving, 2½ in. thick, for foot traffic	2	2
For schools, railway platforms, and pathways	2	2
For roadways, 4 inches thick	4	0

Price depending on quantity and locality.

HOBMAN & Co's "CLIFTON" ARTIFICIAL STONE PAVING.

	s.	d.
Laid in situ, 2 in. thick .. .. per yd. sup.	3	8
In slabs, 2 in. thick, delivered only, per ft. sup.	0	5½
Landings, 4 in. thick „ „ „	1	9
Do. 6 in. „ „ „ „	2	2
Spandril steps, 12 × 6 in., School Board pattern delivered only .. .. per ft. run	1	10

PATENT VICTORIA STONE.

(Company's prices at Stratford Works).

	Per Foot Super. s.	d.
2 in. thick, for street pavement, as laid for London Vestries	0	7
Indurated slabs	0	5
Hearths 2 in. thick	0	8½
	per ft. run.	
Steps 12 in. × 3 in., with nosing	1	2
„ 12 in. × 6 in., plain	2	6
Coping 12 in. × 2 in., double throated ..	0	10
„ 12 in. × 3 in. „ „ ..	1	1
Platform coping, 24 in. × 3 in.	2	2
	per ft. super.	
Sinks, all sizes	1	6
Landings, 3 inches thick, up to 28 ft. super.	1	1
„ 4 „ „	1	6
Sills, 8 in. × 3 in.	1	0

SILICATED STONE PAVING.

This paving is manufactured entirely by machinery, is of uniform texture, requires no squaring, and is easily laid.

The slabs are manufactured in the following sizes:—3 ft. × 2 ft.; 2 ft. 6 in. × 2 ft.; 2 ft. × 2 ft.; and can be sold, delivered into carts or barges, for 6d. per super. foot—cash.

Footways of the above paving have been laid in Oxford Street, Holborn District, Greenwich, and other parts of London.

All roads and streets should be well drained, dry, and sound subsoils; and all roads will wear better, lasting longer, if there is a bed, or foundation, of concrete, from 3 in. to 9 in. in thickness. This concrete to be the true road; the covering, or pavement of any sort, being only a veneering, to be renewed as worn out.

Wood Paving.

The best wood paving must be laid upon a foundation of Portland cement concrete from 6 in. to 9 in. in thickness, to be finished on the surface to absolute truth. The blocks of wood to be pine, 4 in., 5 in., or 6 in. in depth, according to the traffic, the blocks to be laid on a bed of tarred felt, and jointed with a bed of felt (close-jointed). A thin layer of asphalte over the concrete may take the place of the bed of felt, but both will be better.

Stuart's Patent Granolithic Stone Works, Church Row, Limehouse, London; also at Edinburgh, Kirkcudbright, N.B., and Paris.

	s.	d.
Stuart's patent granolithic stone slabs, 2 inches thick, in London, per foot super.	0	7
Ditto, *in situ* pavement, laid complete, from per yard super.	4	0
Ditto, grooved for stables, &c., &c., from per yard super.	5	6
Ditto, fireproof flooring, from per yard super.	7	6
Ditto, landings, 6 inches thick, from per foot super. ..	2	0
Ditto, moulded steps, 12 inches by 6 inches, and marked on tread, per foot run	2	6

Copings, cills, heads, mullions, sinks, treads, curbings, channellings, vases, &c., in colour or plain, according to design.

See also pages 164–5 for concrete and granitic paving.

Best Seyssel Asphalte.

For pavement and flooring on the level of ground.

Quantity.	Thickness.		
	½ in.	¾ in.	1 in.
	s. d.	s. d.	s. d.
Horizontal Work.	per super. ft.		
5000 ft. and upwards	0 7½	0 8½	0 10½
3000 „ „ under 5000 ft.	0 8	0 8½	0 10½
1000 „ „ „ 3000 „	0 8½	0 9½	0 11½
300 „ „ „ 1000 „	0 8½	0 9½	1 0
For Roofing, &c.			
5000 ft. and upwards	0 9½	0 10½	1 1
3000 „ „ under 5000 ft.	0 9½	0 10½	1 2
1000 „ „ „ 3000 „	0 9½	0 11	1 3
300 „ „ „ 1000 „	0 10½	0 11½	1 4

HOISTING.

If above 30 and not exceeding 50 ft., add for each super. ft. ¼*d.*
„ 50 „ 70 „ „ ½*d.*

	per ft. sup. s.	d.
Damp course, 5000 ft. and upwards .. .. ¼ in. thick	0	6½
„ 1000 „ to 5000 ft. .. .. .. „	0	7½
„ 250 „ „ 1000 „ .. .. .. „	0	7½
Channels, 6 in. to 9 in. wide, extra .. .. per ft. run	0	4
„ 9 „ „ 12 „ „ „ .. .. „	0	6
Shallow channels .. .. „	0	2
Skirting, ¼ in. thick, 4 in. high .. .. .. „	0	5
„ „ 6 „ .. .. .. „	0	7
„ „ 9 „ .. .. .. „	0	10
„ „ 12 „ .. .. .. „	1	0
Fillets, 1½ in. .. .. „	0	2
„ 3 „ .. .. „	0	3½
Concrete, 1½ in. thick .. .. per ft. sup.	0	1
Labour—Spreader .. .. per day	6	6
Caldron man .. .. „	5	0

Suggested thicknesses for asphalte.

Damp course and vertical	¼ inch.
Floors and roofs	½ „
Skirtings	¼ „

F. MCNEILL'S FIBROUS ASPHALTE OR FOUNDATION FELT.

	s.	d.
9 in. × 32 in. .. .. each	0	2½
14 in. × 32 in. .. .. „	0	4
18 in. × 32 in. .. .. „	0	5
27 in. × 32 in. .. .. „	0	7½
36 in. × 32 in. .. .. „	0	10½

ROOFING FELT. *See* page 259.

F. MCNEILL & CO.'S FIBROUS ASPHALTE SLABS FOR DAMP COURSE.

Asphalte for floors, basements, roofs, &c., at 2*l.* per ton and upwards.

Pitch, from 50*s.* per ton; tar, from 3½*d.* per gallon, &c., for wood-block floorings, &c.

N.B.—These prices are subject to market fluctuations.

Fibrous Plaster Slabs, 3 ft. 6 in. × 2 ft. 6 in., 9½*d.* per yard super.

Established 1833.

F. McNEILL & CO.

Government Contractors for over 50 Years.

ASPHALTED ROOFING FELT.

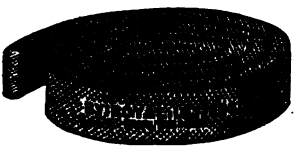
INODOROUS OR BITUMINOUS **FELT** FOR UNDER SLATING.

FIBROUS ASPHALTE

Or Anti-Damp Course, for Foundation Walls.

HAIR FELT,

In sheets and strips, for SOUND DEADENING, and for Non-conducting Purposes of all kinds.



NEW PATENT

PIPE COVERING,

With Canvas Backing, in strips of various widths.

SLAG WOOL OR SILICATE COTTON.

For Pugging Floors, Lining Walls, Ice Houses, Ships' Bulkheads and Decks, &c. &c.

FOR SOUND DEADENING & FIRE-PROOFING, SEE ADVERTISEMENT, PAGE XXIX.

Telegraphic Address:
"EYEBALL, LONDON." "EYEBALL, KIRKINTILLOCH." "EYEBALL, LIVERPOOL."

Head Office and Works:		*Slag Wool and Felt Works:*
Bunhill Row, LONDON, E.C.	3 Wapping, LIVERPOOL.	Kirkintilloch, Near GLASGOW.

[*To face page* 224.

In Demy 4to, handsomely bound in cloth, Illustrated with 220 full-page Plates. Price 15*s*.

ARCHITECTURAL EXAMPLES

IN

BRICK, STONE, WOOD, AND IRON.

A Complete Work on the Details and Arrangement of Building Construction and Design.

By WILLIAM FULLERTON, Architect.

Containing 200 Plates with numerous Drawings selected from the Architecture of Former and Present Times. The details and designs are drawn to scale, ½-inch, ¼-inch, ⅛-inch and full-size being chiefly used. The Plates are arranged in two parts.

The First Part contains Details of Work in the Four principal Building Materials; the following being a few of the subjects in this Part. Various forms of Doors and Windows, Wood and Iron Roofs, Half-Timber Work, Porches, Towers, Spires, Belfries, Flying Buttresses, Groining, Carving, Church Fittings, Constructive and Ornamental Iron Work, Classic and Gothic Moulds and Ornament, Foliation, Natural and Conventional, Stained Glass, Coloured Decoration, a section to Scale of the Great Pyramid, Grecian and Roman Work, Continental and English Gothic, Pile Foundations, Chimney Shafts according to the regulations of the London County Council, Board Schools.

The Second Part consists of Drawing of Plans and Elevations of Buildings arranged under the following heads:—Workmen's Cottages and Dwellings, Cottage Residences and Dwelling Houses, Shops, Factories, Warehouses, Schools, Churches and Chapels, Public Buildings, Hotels and Taverns, and Buildings of a general character.

All the Plates are accompanied with particulars of the work, with explanatory Notes and Dimensions of the various parts.

The purpose of this book is chiefly to serve as a condensed form of reference for examples of the most essential parts of building construction and ornament, classified, but arranged somewhat in the nature of a sketch-book. The work is also intended to be of use to the student and those already actively engaged in architectural work, whether designing the arrangement, construction, and ornament of buildings, or engaged among the different trades in their execution.

E. & F. N. SPON, 125 Strand, London.

New York: SPON & CHAMBERLAIN, 12 Cortlandt Street.

CARPENTER.

PRIME COST PRICE OF MATERIALS.

Wholesale Prices of Timber, Deals, Boards, &c.

Timber.	£	s.	d.		£	s.	d.
Deals per C 12 ft. by 3 in. by 9 in. :—							
Canada pine, 1st	21	0	0	to	24	10	0
„ 2nd	16	0	0	„	17	0	0
„ 3rd, &c.	8	0	0	„	10	0	0
Canada spruce, 1st	9	0	0	„	10	10	0
„ 3rd and 2nd	6	10	0	„	7	10	0
New Brunswick	6	0	0	„	7	0	0
St. Petersburg, 1st yellow	9	10	0	„	12	0	0
„ 2nd „	7	10	0	„	9	0	0
Finland, 2nd and 1st	7	0	0	„	8	10	0
„ 4th and 3rd	7	0	0	„	8	0	0
Riga	7	0	0	„	8	0	0
Battens, all sorts	5	0	0	„	20	0	0
Flooring boards, per sq. of 1 in. :—							
First	0	9	6	„	0	14	0
Second	0	6	6	„	0	11	6
Other qualities	0	4	6	„	0	7	6
Quebec pine, red	2	10	0	„	3	10	0
„ „ yellow	2	10	0	„	5	10	0
„ „ pitch	3	5	0	„	5	15	6
„ oak	5	0	0	„	7	0	0
„ birch	3	5	0	„	4	5	0
„ elm	3	10	0	„	4	5	0
„ ash	2	10	0	„	4	5	0
Teak, E.I.	10	0	0	„	16	0	0
Dantzic and Memel oak	2	15	0	„	4	15	0
Fir, Dantzic, &c.	2	0	0	„	3	10	0
„ undersized	2	10	0	„	3	0	0
Lathwood, per cubic fathom.							
St. Petersburg	5	0	0	„	6	0	0
Dantzic	4	10	0	„	5	10	0
Mahogany, per foot super.							
Honduras, cargo average	0	0	3½	„	0	0	5½
Mexican „	0	0	3	„	0	0	4
Tobasco „	0	0	3½	„	0	0	6
Cuba „	0	0	3	„	0	0	6
St. Domingo „	0	0	3	„	0	1	6
Ditto „ curls							
Cedar, per foot super.							
Cuba	0	0	3½	„	0	0	4½
Honduras and Mexican	0	0	3½	„	0	0	4½
Australian	0	0	2½	„	0	0	3½
Pencil	0	0	5	„	0	0	6
Walnut, per foot super.							
Italian	0	0	3½	„	0	0	7
Black Sea	0	0	6	„	0	0	8
American, per foot cub.	0	4	0	„	0	4	6

PRIME COST PRICE OF MATERIALS—*continued.*

QUOTATIONS FOR TIMBER AT THE WHARF.

	in.	in.	ft.	ft.	Per Load. £	s.	d.
Sawn Pitch Pine Timber	11 to	14 ×	14 to	26 ..	4	0	0
Pitch Pine Timber	15 „	20 ×	43 „	47 ..	4	10	0
Good Middling Danzig	9 „	11 ×	19 „	35 ..	3	5	0
Crown Danzig	10 „	11 ×	16 „	37 ..	3	17	6
Crown Saldowitz	9 „	11 ×	20 „	28 ..	3	17	6
					From		
Best Middling Danzig	12 „	15 ×	19 „	40 ..	5	0	0
„ „ „	15 „	23 ×	22 „	46 ..	5	10	0
TIMBER AT THE DOCKS.							
Crown Danzig	9 to	11 ×	25 to	37 ..	3	5	0
Best Middling Danzig	12 „	14 ×	21 „	38 ..	4	7	6

The price per Petersburg Standard, and its equivalent per 120 12 ft. of various sizes.

Petersburg Standard.	120 12 feet.		
	9 in. by 9 in.	3 in. by 7 in.	2½ in. by 7 in.
£ s. d.	£ s. d.	£ s. d.	£ s. d.
0 5 0	0 8 2	0 6 5	0 5 3
5 0 0	8 3 8	6 7 3	5 6 1
6 0 0	9 16 4	7 12 9	6 7 4
7 0 0	11 9 1	8 18 2	7 8 6
8 0 0	13 1 10	10 3 8	8 9 9
9 0 0	14 14 7	11 9 1	9 10 11
10 0 0	16 7 3	12 14 7	10 12 1

ENGLISH OAK.

	per ft. cub. s.	d.
Sawn to scantlings	5	6
In plates, sleepers, bond, &c.	6	0
Rough framed	7	0
Wrought and framed	8	0
In "proper" frames	9	6

OAK IN THICKNESSES, INCLUDING WASTE, NAILS AND FIXING.

	Inch.	1½ in.	2 in.	2½ in.
	s. d.	s. d.	s. d.	s. d.
Rough .. .. per ft. sup.	0 10	1 2½	1 6	1 10
Edges, shot .. „	0 11	1 3½	1 7	1 11
Framed .. .. „	1 3	1 8½	2 2	2 10
Wrought, one side, add „	0 2	—	—	—
Ploughed and tongued „	0 1½	—	—	—

TABLE SHOWING THE PRICE OF TIMBER PER FOOT ACCORDING TO THE PRICE PER LOAD.

Per Load of 50 Cubic Feet.	Per Cubic Foot.	Per Superficial Foot of			
		1¼ inch.	1 inch.	¾ inch.	½ inch.
£ s. d.	d.	d.	d.	d.	d.
2 0 0	10	$1\frac{3}{10}$	$\frac{4}{5}$	$\frac{12}{16}$	$\frac{4}{10}$
2 10 0	12	1^{6}	1	$\frac{12}{16}$	$\frac{5}{10}$
3 0 0	14	1^{6}	$1\frac{1}{2}$	1^{6}	6
3 10 0	17	2^{1}	1^{3}	1^{1}	7
4 0 0	19	2^{4}	1^{3}	1^{4}	8
4 10 0	22	2^{7}	1^{4}	1^{7}	9
5 0 0	24	3	2	1^{10}	1
5 10 0	26	3^{3}	$2\frac{1}{2}$	1^{13}	1^{1}
6 0 0	29	3^{6}	2^{3}	1^{16}	1^{3}
6 10 0	31	$3\frac{9}{10}$	$2\frac{1}{2}$	$1\frac{19}{10}$	$1\frac{3}{10}$
7 0 0	34	4^{2}	2^{4}	2^{2}	1^{4}
7 10 0	36	4^{5}	3	2^{5}	1^{5}
8 0 0	38	4^{8}	$3\frac{1}{2}$	2^{8}	1^{6}
8 10 0	41	5^{1}	3^{3}	2^{11}	1^{7}
9 0 0	43	5^{4}	3^{3}	2^{14}	1^{8}
9 10 0	46	5^{7}	3^{4}	2^{17}	1^{9}
10 0 0	48	6	4	3	2
10 10 0	50	6^{2}	$4\frac{1}{2}$	3^{3}	2^{1}
11 0 0	53	6^{6}	4^{3}	3^{6}	2^{2}
11 10 0	55	6^{9}	4^{3}	3^{9}	2^{3}
12 0 0	58	7^{2}	4^{4}	3^{12}	2^{4}
12 10 0	60	7^{5}	5	3^{15}	2^{5}
13 0 0	62	7^{8}	$5\frac{1}{2}$	3^{18}	2^{6}
13 10 0	65	8^{1}	5^{3}	4^{1}	2^{7}
14 0 0	67	8^{4}	5^{3}	4^{4}	2^{8}
14 10 0	70	8^{7}	5^{4}	4^{7}	2^{9}
15 0 0	72	9	6	4^{10}	3
15 10 0	74	9^{3}	$6\frac{1}{2}$	4^{13}	3^{1}
16 0 0	77	9^{6}	6^{3}	4^{16}	3^{2}
16 10 0	79	9^{9}	6^{3}	4^{19}	3^{3}
17 0 0	82	10^{2}	6^{4}	5^{2}	3^{4}
17 10 0	84	10^{5}	7	5^{5}	3^{5}
18 0 0	86	10^{8}	$7\frac{1}{2}$	5^{8}	3^{6}
18 10 0	89	11^{1}	7^{3}	5^{11}	3^{7}
19 0 0	91	11^{4}	7^{3}	5^{14}	3^{8}
19 10 0	94	11^{7}	7^{4}	5^{17}	3^{9}
20 0 0	96	12	8	6	4
20 10 0	98	12^{3}	$8\frac{1}{2}$	6^{3}	4^{1}
21 0 0	101	12^{6}	8^{3}	6^{6}	4^{2}
21 10 0	103	12^{9}	8^{3}	6^{9}	4^{3}
22 0 0	106	13^{3}	8^{4}	6^{12}	4^{4}
22 10 0	108	13^{6}	9	6^{15}	4^{5}
23 0 0	110	13^{9}	$9\frac{1}{2}$	6^{18}	4^{6}
23 10 0	113	14^{1}	9^{3}	7^{1}	4^{7}
24 0 0	115	14^{4}	9^{3}	7^{4}	4^{8}
24 10 0	118	14^{7}	9^{4}	7^{7}	4^{9}
25 0 0	120	15	10	7^{10}	5

TABLE SHOWING THE VALUE OF DIFFERENT SCANTLINGS IN PENCE PER FOOT RUN, ACCORDING TO THE PRICE OF TIMBER, AT 3*s.* 6*d.* PER FOOT CUBE.

Ins.	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12
	d.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
2	1	1¼	1½	2	2½	2¼	3	3¼	3½	3¾	4	4¼	4½	5	5¼	5½	5¾	6	6¼	6½	7
2½	1¼	1½	2¼	2½	3	3¼	3¾	4	4¼	4½	5	5¼	5½	6¼	6¾	7	7¼	7½	8	8¼	8½
3	1½	2¼	2½	3	3¾	4	4¼	4½	5¼	5½	6	6¼	7	7¼	8	8¼	8½	9¼	9¼	10	10¼
3½	2	2½	3	3¼	4	4¼	5	5¼	6	6½	7	7½	8	8¼	9¼	9½	10¼	10½	11¼	11½	12¼
4	2¼	3	3¼	4	4½	5¼	5½	6¼	7	7¼	8	8½	9¼	10	10¼	11	11½	12¼	12½	13¼	14
4½	2½	3¼	4	4½	5¼	6	6¼	7¼	8	8¼	9½	10	10¼	11	11½	12¼	13	13½	14¼	15	15½
5	3	3½	4¼	5	5½	6¼	7¼	8	8½	9¼	10¼	11	11½	12¼	13	14	14¼	15¼	16	16½	17¼
5½	3¼	4	4½	5¼	6¼	7¼	8	8½	9¼	10¼	11¼	12	12½	13½	14¼	15¼	16	16½	17½	18¼	19¼
6	3½	4¼	5¼	6	7	8	8½	9¼	10¼	11¼	12½	13	14	15	16	17	17¼	18¼	19¼	20	21
6½	3¾	4½	5½	6½	7¼	8¼	9¼	10¼	11¼	12¼	13½	14¼	15	16	17	18	19	20	21	21½	22½
7	4	5	6	7¼	8	9¼	10¼	11¼	12½	13½	14¼	15½	16¼	17¼	18¼	19¼	20¼	21¼	22¼	23¼	24½
7½	4¼	5¼	6¼	7½	8½	10	11	12	13	14¼	15¼	16¼	17¼	18¼	19½	20½	22	23	24	25	26¼
8	4½	5½	7	8	9¼	10¼	11½	12½	14	15	16¼	17¼	18½	19½	21	22	23¼	24¼	25½	26½	28
8½	5	6¼	7¼	8½	10	11	12¼	13½	15	16	17¼	18¼	19½	21	22¼	23¼	24½	26	27¼	28¼	29½
9	5¼	6½	8	9¼	10¼	11½	13	14¼	15½	17	18¼	19½	21	22¼	23¼	25	26¼	27½	29	30¼	31½
9½	5½	7	8¼	9½	11	12¼	14	15¼	16½	18	19¼	20½	22	23¼	25	26¼	27½	30	30¼	32	33¼
10	5¾	7¼	8½	10¼	11½	13	14¼	16	17¼	19	20¼	22	23¼	24½	26¼	27½	29	30¼	32	33½	35
10½	6	7½	9¼	10½	12¼	13½	15¼	17	18¼	20	21¼	23	24¼	26	27¼	29	30¼	32	33½	35¼	36½
11	6¼	8	9¼	11¼	12½	14¼	16	17½	19¼	21	22¼	24	25½	27¼	29	30¼	32	33½	35¼	37	38½
11½	6½	8¼	10	11½	13¼	15	16½	18¼	20	21½	23¼	25	26½	28¼	30¼	32	33¼	35½	37	38¼	40¼
12	7	8½	10¼	12½	14	15½	17¼	19¼	21	22½	24½	26¼	28	29½	31½	33¼	35	36½	38¼	40¼	42

Price List of Sawing.

Length.	Battens. Per doz. Cuts. s. d.	Deals. Per doz. Cuts. s. d.	Planks. Per doz. Cuts. s. d.
6 feet.	1 4	1 6	2 0
7 „	1 6	1 9	2 3
8 „	1 8	2 0	2 6
9 „	1 10	2 3	2 9
10 „	2 0	2 6	3 0
11 „	2 2	2 9	3 3
12 „	2 3	3 0	3 6
13 „	2 4	3 3	3 10
14 „	2 6	3 6	4 3
15 „	2 8	3 9	4 9
16 „	2 10	4 0	5 0
17 „	3 0	4 3	5 3
18 „	3 3	4 6	5 6
19 „	3 6	4 9	6 0
20 „	3 9	5 0	6 3
21 „	4 0	5 3	6 6
22 „	4 3	5 6	7 0
23 „	4 6	5 9	7 6
24 „	4 9	6 0	8 0
25 „	5 0	6 3	8 6
26 „	5 3	6 6	9 0
30 „	6 3	7 6	11 0

3 inch Flatting 1*s.* 0*d.* per 100 feet run.
4 „ „ 1*s.* 4*d.* „ „
Deeping 12 to 15 in. wide Planks 2*s.* 6*d.* per 100 ft. sup.
„ 16 to 20 „ „ 3*s.* 0*d.* „ „

Prices of Sawing for Timber, &c.

	Per 100 ft. sup. under 24 in. deep. s. d.
Mahogany, Honduras	6 3
„ Spanish, &c.	7 6
Teak	8 0
Yellow Pine	4 6
Pitch Pine	6 0
Wainscot	6 0
American Ash and Whitewood	6 0
„ Oak, Elm, Hickory, and Black Walnut	7 0

	Per 100 ft. sup. all depths. s. d.
English Oak, Beech, Sycamore, Plane Tree, Elm, Ash, Chestnut, and Lime Tree	7 0
Baltic Fir, 3 Cuts to load under 12 in.	7 6
„ „ 12 in. square and upwards, 4 Cuts to load	
„ „ per 100 ft. super	4 0

Prices for Planing, &c.

At per square up to and including 1¼ inch thick; if 1¼ in., add 3*d.* per square.
Boards under 6 ins. wide charged as that width.

	s.	d.
Sawing and planing	2	3
„ „ and grooving	3	0
„ „ both sides	3	9
„ „ and rebated or matched or chamfered	3	3
„ „ matched and beaded or chamfered	3	9
„ edging and thicknessing	2	3
„ „ „ and grooving	2	6
„ planed both sides and matched	4	6
„ planing, matching, and beading both sides	5	0
Prepared Boards, grooved or beaded	1	9
„ „ matched only	2	0
„ „ matched and beaded, or grooved and beaded	2	3
„ „ rebated and beaded only	2	6

Special prices for moulding hand-rails, stair treads, sash sills, door jambs, skirting, architraves, &c., on application.

Scaffolding.

	s.	d.	
Petersburg Poles, 15 feet	0	10	each.
„ „ 22 „	1	8	„
„ „ 28 „	3	0	„
„ „ 35 „	5	6	„
„ „ 42 „	7	6	„
Birch Putlogs	8	0	per doz.
Scaffold Boards, Spruce, 1¼ × 9, as 12 ft.	1	4½	each.

English Oak for Fencing.

	s.	d.	
Oak Posts, 12 ft., 10 × 10	32	9	each.
„ 10 „ 9 „ 9	22	6	„
„ 9 „ 9 „ 9	21	0	„
„ 9 „ 8 „ 8	14	9	„
„ 10 „ 7 „ 7	14	3	„
„ 7 „ 7 „ 7	10	0	„
„ 10 „ 6 „ 6	10	3	„
„ 6 „ 6 „ 6	6	0	„
„ 10 „ 6 „ 4	4	0	„
„ 9 „ 6 „ 4	3	8	„
„ 8 „ 6 „ 4	2	11	„
„ 7 „ 6 „ 4	2	5	„
„ 6 „ 6 „ 4	2	1	„
„ 7 „ 5 „ 5	3	6	„
„ 10 „ 5 „ 4	3	11	„
„ 6 „ 5 „ 4	1	11	„
„ 5 „ 5 „ 4	1	8	„
„ 10 „ 4 „ 4	3	6	„
„ 5½ „ 4 „ 4	1	10	„
Oak Gravel Planks, 9 ft., 1¼ × 9	2	5	„
„ „ 9 „ 1¼ „ 8	2	3	„
„ „ 9 „ 1¼ „ 6	1	11	„
„ „ 7 „ 1¼ „ 6	1	8	„
Stumps for Planks	0	1¼	„
Oak Cleft or Sawn Pales, 6 ft.	24	6	per 100 pieces.
„ „ 5 „	20	0	
„ „ 4 „	16	6	
„ „ 2 „	8	6	

Sundries.

Oak Shingles, 9*s.* 9*d.* per 100.
Ladder Staves, 8*s.* 6*d.* per 100. Oak Plasterers' Laths, 1*s.* 6*d.* per 400 ft.
Oak Tiling Laths, 4*s.* 6*d.* per 400 ft.

PLANKS, DEALS, AND BATTENS. WHARF PRICES.

			Petersburg Standard.	Per 120 of 12 feet.
			£ s. d.	£ s. d.
Pitch Pine Planks	5 × 9	Prime Pensacola .. dry	12 5 0	33 8 2
„	3 × 9	„ „ „	11 15 0	19 4 7
Yellow Planks ..	4 × 12	Soderhamn	9 5 0	26 18 2
„ ..	„	3rd Gefle	13 10 0	39 5 5
„ ..	4 × 11	4th Hudikswall	11 5 0	30 0 0
„ ..	„	3rd Gefle	13 15 0	36 13 4
„ ..	3 × 11	Swartwick	8 5 0	16 10 0
„ ..	„	2nd Petersburg (Gromoffs).. .. .. dry	12 10 0	25 0 0
„ ..	„	1st Petersburg .. „	14 10 0	29 0 0
„ ..	„	1st „ M.G. Co. 1881	19 10 0	39 0 0
Yellow Deals ..	4 × 9	Gothenburg	10 0 0	21 16 4
„ ..	„	4th Soderhamn .. dry	12 10 0	27 5 5
„ ..	4 × 9	1st and 2nd Gefle.. dry	16 10 0	36 0 0
„ ..	3 × 9	Gothenburg	8 15 0	14 6 4
„ ..	„	Unsorted Swartwik ..	9 15 0	15 19 1
„ ..	„	3rd Domajo .. .. dry	13 15 0	22 10 0
„ ..	„	1st Petersburg .. „	14 10 0	23 14 7
„ ..	„	1st Quality Crown „	16 10 0	27 0 0
„ ..	„	1st Archangel .. „	19 10 0	31 18 2
„ ..	3 × 8	Sundswall	8 10 0	12 7 3
„ ..	„	1st and 2nd Neder Calix	10 5 0	14 18 2
„ ..	„	3rd Soderhamn	11 0 0	16 0 0
„ ..	2½ × 8	1st and 2nd Watsalo ..	8 15 0	10 12 1
„ ..	2 × 9	2nd Riga	10 10 0	11 9 1
„ ..	2 × 8	3rd Soderhamn	10 5 0	9 18 9
„ ..	„	1st and 2nd Neder Calix	10 10 0	10 3 8
Yellow Battens ..	4 × 7	3rd Gothenburg	10 15 0	18 4 10
„ ..	3 × 7	2nd Ny Carleby	8 5 0	10 10 0
„ ..	„	1st Petersburg	11 10 0	14 12 9
„ ..	2½ × 7	4th Abo	8 15 0	9 5 7
„ ..	„	3rd Gothenburg	9 10 0	10 1 6
„ ..	„	1st Petersburg ..1881	11 10 0	12 3 11
„ ..	2½ × 6½	2nd „	8 10 0	8 7 6
„ ..	2½ × 6	2nd „	9 0 0	8 3 7
„ ..	2 × 7	4th Gefle	9 0 0	7 12 8
„ ..	„	3rd Soderhamn	9 15 0	8 5 5
„ ..	2 × 6	Gothenburg	7 15 0	5 12 9
„ ..	2 × 5	3rd Soderhamn	8 5 0	5 0 0
„ ..	2 × 4½	Unsorted Fredrikstadt..	8 15 0	4 15 5
„ ..	2 × 4	„ „ ..	9 5 0	4 9 8
„ ..	„	Unsorted Sandarne ..	10 15 0	5 4 3
White Planks ..	3 × 11	2nd Petersburg .. dry	10 5 0	20 10 0
„ ..	„	1st „	11 15 0	23 10 0
White Deals ..	3 × 9	Unsorted Abo	8 15 0	14 6 4
„ ..	„	1st Petersburg	10 10 0	17 3 8
„ ..	„	1st Petersburg M. G. Co. .. .. dry	11 10 0	18 16 4
„ ..	2 × 9	Unsorted Gefle	9 5 0	10 1 10

PLANKS, DEALS, AND BATTENS. WHARF PRICES—*continued.*

			Petersburg Standard.	Per 120 of 12 feet.
			£ s. d.	£ s. d.
White Battens ..	3 × 7	2nd Petersburg	8 0 0	10 3 8
„ ..	2½ × 6½	2nd Bangsund	7 15 0	7 12 8
„ ..	2½ × 6	Unsorted Kramfors ..	7 15 0	7 0 11
„ ..	2 × 7	Unsorted Torefors ..	7 15 0	5 12 9
„ ..	2 × 4	Unsorted Anga	7 15 0	3 15 0
Spruce Planks ..	3 × 11	2nd Quebec .. .. dry	10 15 0	21 10 0
Spruce Deals ..	3 × 9	3rd „	8 10 0	13 18 2
„ ..	„	„ „ .. .. dry	9 5 0	15 2 9
„ ..	3 × 8	1st „	9 15 0	14 3 8
Spruce Battens ..	3 × 7	3rd „	8 10 0	10 16 4
Yellow Pine Planks	3 × 11	3rd bright Saguenay ..	10 0 0	20 0 0
„ ..	„	3rd Quebec	10 10 0	21 0 0
„ ..	„	3rd bright Quebec dry	11 10 0	23 0 0
„ ..	„	1st „ „ .. 1880	36 0 0	72 0 0
„ ..	3 × 12/25	„ „ „ .. from	42 0 0	—

CARPENTER.

Prime Cost Prices of Materials.

Oak cleft pales, per score (4 ft. high) 6*s.* 3*d.*, (5 ft. high) 7*s.* 3*d.*, (6 ft. high) 9*s.*

Oak cleft pale fence, 4 ft. high, with 2 arris rails and oak posts 9 ft. apart, fixed complete, per rod lineal, 38*s.*

1¼ oak gravel plank, 8 in. wide, per foot run, 8*d.*

Oak field gates, with wrought rails, 5-bar and braced, 9 ft. wide, with post, spurs and fastenings, &c., complete, each 50*s.*

Timber Merchants' Prices.

Best dry yellow and white goods. For joinery and good general work.	*d.*	*d.*	*d.*
3 × 11 Yellow Plank .. ..per ft. run	7	7½	8
3 × 9 „ Deals.. .. .. „	5	5½	5½
2½ × 7 „ Battens .. .. „	3	3½	4
3 × 11 White Plank .. .. „	6	6½	7
3 × 9 „ Deals .. .. „	4½	4½	5
2½ × 7 „ Battens .. .. „	2½	3	3½

Common qualities.	*d.*	*d.*
3 × 11 Yellow Plank .. .. „	4 to	6
3 × 9 „ Deals .. .. „	3 „	4½
2½ × 7 „ Battens .. .. „	2 „	2½
3 × 11 White Plank .. .. „	4 „	5½
3 × 9 „ Deals .. .. „	3 „	4
2½ × 7 „ Battens .. .. „	2 „	2½

Flooring and Matchboards.

	Per Square.	
	s.	*d.*
Yellow Floor Boards.		
1¼ × 7 1st quality, London prepared grooved for iron tongues ..	19	0
„ „ „ „ dry	22	6
1¼ × 7 2nd quality K + S	14	0
1¼ × 6½ do. grooved for iron tongues .. dry	15	6
1¼ × 7 second quality .. .. „	16	0
„ 1st quality K ♚ S	17	0
1 × 7 3rd quality (Fredrikstadt)..	9	0
1 × 6 2nd „ „ „	10	0
1 × 7 „ „ „ „ .. .. dry	11	6
„ 1st quality ♚ .. .. „	14	6
⅞ × 6½ 3rd „ (Fredrikstadt)..	8	0
⅞ × 7 2nd „ „ „ .. .. dry	9	6
⅞ × 6 1st „ „ „ .. .. „	9	9
⅞ × 6½ „ „ „ „ .. .. „	10	3
White Floor Boards.		
1 × 6 3rd quality	7	6
⅞ × 6½ „ „	7	6
⅞ × 7 2nd „ (Fredrikstadt)..	8	6
⅞ × 7 „ „	7	9
Yellow V-jointed Matchboards.		
1 × 5 1st and 2nd quality .. .. .. dry	13	0

PRIME COST PRICE OF MATERIALS—*continued.*

TIMBER MERCHANTS' PRICES—*continued.*

FLOORING AND MATCHBOARDS—*continued.*

			s.	d.
Yellow Match Boards.				
1½ × 6	Double beaded Archangel	dry	13	9
1 × 7	1st quality	„	14	6
⅞ × 5½	2nd „ K + S		8	6
⅞ × 7	1st „ K [crown] S		10	6
„ „ „	(Fredrikstadt)	dry	11	0
⅞ × 5½	2nd „ „		6	6
⅞ × 4½	1st „ D B [crown] & Co.		8	9
⅞ × 7	„ „ (Fredrikstadt)	dry	9	3
⅛ × 7	2nd „ „	„	6	6
„	1st „ „	„	7	6
⅞ × 5½	2nd „ „		7	0
White Matchboards.				
⅞ × 6½	2nd quality	dry	6	9
⅞ × 7	1st „	„	8	0
⅛ × 7	„ „		6	0

SUNDRIES.

		s.	d.
Spruce Palings, ⅞ × 3	per 120	6	6
Hand-made Laths (360 ft. per bundle)	per load	21	0
London-made „ (300 ft. „)	„	25	0
Poles, 22 ft.	per foot	0	1½
„ 28 ft.	„	0	1⅝
„ 35 ft.	„	0	1¾
Putlogs	per dozen	7	6
English Oak Sills	per ft. cube	4	6
„ Scantling from	„	5	0
Oak Park Paling, with posts and rails complete for fixing	„ per yard	5	0

		s.	d.	s.	d.	s.	d.
Blind Laths	per bundle	10	0	11	0	11	6
Slating	„	—		3	6	4	0
Pantile	„	2	0	2	3	2	6
Crate	„	—		3	0	3	6
Trellis	„	2	6	—		—	

⅞ in. × 3 in. Palings, 4½ ft. 14*s.* per 120. 4 ft. 13*s.*

Trellis Work, 7*d.* per ft. super. when closed, in heights from 1½ to 8 ft., width 2½ ft. (open to 12 ft. wide).

FIR.

		£	s.	d.
Prime cost	per load	3	0	0
Sawing and cartage, extra	„	1	0	0
Sawn to scantlings	per cube foot	0	2	4
In plates, lintels, bond, &c.	„	0	2	6
Rough framed in floors, roofs, &c.	„	0	2	9
Wrought and framed	„	0	3	9
„ in "proper" frames	„	0	5	0
Planing on sawn fir	per ft. sup.	0	0	1

Wainscot and Honduras Mahogany.

	¼ in.	⅜ in.	1 in.	1¼ in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Rough (including waste) per ft. sup.	0 10	1 0	1 1½	1 7	1 11	2 7
Rough (including labour and nails), add	0 2	0 2	0 2½	0 3	0 3	0 3½
Wrought, one side, add	0 2½	0 2½	0 2⅝	0 2⅝	0 2⅝	0 3½
„ both sides „	0 4½	0 4½	0 5¼	0 5¼	0 5¼	0 5¼
Ploughed and tongued „	—	0 1	0 1	0 1	0 1	0 1¼
Framed, add	—	0 5	0 5	0 5½	0 6	0 7
Fixed „	0 1	0 1	0 1	0 1¼	0 1½	0 1½

Centering.

	s.	d.
To vaults on 3-in. ribs with ¼-in. boarding, including fixing, striking, and removing, for use and waste only .. .. per square	28	0
Moving and refixing	7	6
To brick-trimmers, &c. .. .. .. per ft. sup.	0	8
To gauged arches with struts .. „ run	0	9

Planking and strutting to foundations, average depth 8 ft., per foot run, 1*s.* 6*d.*

Roofing.

Labour and Nails only—per square.

	s.	d.
Common shed, one story high	4	6
„ three stories	6	6
Cottage roof	8	6
Span roof, with principals (9 ft. apart), collars, purlins, plates, and ridge	13	0
Span roof, with principals (9 ft. apart), tie beams, king posts, purlins, braces, and common rafters	17	6
Wall plates, lintels, &c. .. at per foot cube	0	5

Battening.

All Materials—per square.

	s.	d.
2½ in. × 1 in. for Countess slating	9	0
„ „ for walls 12 in. apart	9	6
Tilting fillets .. .. per foot run	0	2

Gutters, &c.

	⅝ in.	1 in.	1½ in.
	s. d.	s. d.	s. d.
Deal gutters and bearers per ft. sup.	0 5	0 7	0 9
Feather-edged lear-boards „	0 4	0 5	0 6
Extra for rebated drips .. .. each	—	—	0 4
„ for cesspools .. .. .. „	—	—	2 0

Hip and ridge roll, per foot run, 3*d*.

Bracketing.

Including plugging.

	s. d.
To coves and cornices .. .. .. per ft. super.	0 8
„ „ circular add „	0 4
„ waggon head ceilings .. .. „	0 7

Labour and Nails only.

Quarter partitions and floors.

	s. d.
Ceiling joists notched on plates .. per square	5 0
Quarter partitions, 4-in. framed and braced .. .. „	7 0
Quarter partitions, circular on plan add .. .. „	2 0
Single-framed floors trimmed to fireplaces, stairs, &c. .. .. .. „	9 6
Ground floors bedded, not framed „	5 0
„ framed to chimneys, &c. „	7 9
Herring-bone strutting .. .. .. per ft. run	0 3

JOINER.

Deal Boarding and Flooring.

All Materials per Square.

	¾ in.		1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Rough	16	0	20	0	24	0	28	0
„ edges shot	18	0	22	0	28	0	34	0
„ ploughed and tongued	20	0	24	0	31	0	37	0

Sound boarding on fillets, 21*s.*; if herring-boned, add 1*s.* 6*d.* Weather boarding, measured on face, 4 boards out of 3-in. deal rough, per square, 30*s.*

	1 in.		1¼ in.		1½ in	
	s.	d.	s.	d.	s.	d.
Wrought one side, tongued and beaded	28	0	35	0	41	0
White deal wrought and laid folding	26	0	32	0	37	0
Yellow, wrought and laid folding	29	0	36	0	42	0
If ploughed and tongued add per square	5	0	5	0	6	6
If tongued with iron „	6	0	6	0	6	0
If listed	3	6	3	6	3	6

Mitred margins, per foot run, 6*d.*

		1 in.		1¼ in.	
		s.	d.	s.	d.
Batten floors, wrought and laid folding	per square	28	0	32	0
Straight joint wainscot ..	„	155	0	185	0
If dowelled, add	„	25	0	27	6
Barn floors 2-in. oak, listed and dowelled with oak pins	„	..	..	104	0
Warehouse floors, 1¼-in. wrought and folding, deal	„	..	..	40	0

Hawksley's Patent Stair Treads,

As used at Metropolitan Railway Stations.

Made of cubes of hard wood, per ft. super., 4*s.* 2*d.*

London-made Parquet Flooring.
(Exclusive of laying.)

	Per ft. Sup.
	s. *d.*
Solid deal interlaced .. .. .. 1 inch thick	0 9
„ deal and cherry.. .. .. „	1 0
„ oak interlaced .. .. .. „	1 9
„ oak and walnut.. .. .. „	2 3
„ „ and sycamore .. .. „	2 9
„ „ maple, and mahogany „	3*s.* to 4*s.*
Rich patterns .. .. „	4*s.* to 9*s.*
Setting out and laying .. .. „	0 10
If French polished, add .. .. „	0 3

Veneered Parquet Floor, one-fourth less.

Hungarian Oak Batten and Solid Parquet Floors.

Designs.	Usual size.	Per sup. foot.
	inches.	*s.* *d.*
Prepared Batten Flooring, 1 inch thick.		
No. 1–3 in oak	20 × 4	0 9
„ 1–3 in elm	„	0 7
Solid Parquet Centres, grooved and tongued together, 1 inch thick.		
No. 4 in oak	13	1 0
„ 16 and 17 in oak	20	1 2
„ 18 in oak and white ash	16½	1 3
„ 20 „ walnut	13½	1 6
„ 22 „ „ and ash ..	19	1 6
„ 23 „ „ „ ..	19	2 1
„ 30 „ „	19½	2 5
Solid Parquet Borders, grooved and tongued together, 1 inch thick.		
No. 1 in oak, walnut and ash width	8	1 11
„ 2 and 3 in oak, walnut and ash „	8	2 4
„ 5 in oak and ash .. .. .. „	8	2 2
„ 7 and 10 in oak, walnut and ash „	8	3 3
„ 8, 9, 11 and 12 in oak and walnut „	8	3 8
„ 13 in oak .. .. „	12	1 3

W. DUFFY'S PATENT "IMMOVABLE ACME" WOOD BLOCK FLOORING, suitable for Churches, Schools, Warehouses, Basements, &c., laid by THE ACME WOOD FLOORING COMPANY, LIMITED.

Prices per yard superficial:

	1¼ in. 1st quality.	1¼ in. 2nd quality.	1¼ in. 3rd quality.
	s. d.	s. d.	s. d.
Deal	7 0	6 0	5 0
Pitch Pine	8 0	7 0	6 0

For all other kinds, prices on application.

These prices are for laying the work complete (exclusive of concrete, which must be floated with Portland cement to a perfect level), including the composition, of a highly preservative and adhesive character, and all cutting and cleaning off.

WHITE'S WOOD BLOCK FLOORING.—For churches, schools, &c.

(Exclusive of laying). *See also* pp. 223, 250.

	1¼ in. thick.	1½ in. thick.	2 in. thick.	2½ in. thick.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Quality A..	1 10 6	1 14 0	1 18 6	2 9 0
„ B..	2 5 0	2 10 0	2 15 0	3 7 0
„ C..	2 18 0	3 3 0	3 8 0	—

A. Ordinary pattern from rough deals, prepared from common yellow deals.
B. Ditto, wrought upper face, prepared from second yellow deals.
C. Ditto, wrought upper face and joints, and prepared from first yellow deals.

Deal Fixed and Fitted—per ft. super.

	⅛ in.		⅜ in.		1 in.		1¼ in.		1½ in.		2 in.		2½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Rough, including labour and nails	0	3½	0	4	0	5	0	6½	0	8	0	9	0	11½
Do. with edges shot ..	0	4	0	4½	0	5½	0	7	0	8½	0	10½	1	0½
Wrought, one side	0	5	0	5½	0	6½	0	8	0	9½	0	11½	1	2
Do. both sides	0	5½	0	6	0	7½	0	8½	0	10½	1	0½	1	3½
Do. grooved and tongued	0	6½	0	6½	0	8	0	10	1	0	1	2	1	5½
Do. framed, kayed, and clamped	0	6½	0	7	0	8	0	10	1	0½	1	2½	1	5½
Do. mortise clamped ..	—		0	8½	0	10	0	11½	1	1	1	3	1	6½
If with bearers .. add	0	1	0	1½	0	2	0	2½	0	3	0	4	0	5
If plugged to walls .. „	0	1	0	1	0	1½	0	2	0	2	0	2½	0	2½
If beaded, one side .. „	0	0½	0	0½	0	1	0	1	0	1	0	1	0	1
If ledged .. .. .. „	0	1½	0	1½	0	2	0	2	0	2½	0	2½	0	3
If dovetailed .. .. „	0	1½	0	2	0	2	0	3	0	3½	0	3½	0	4
If mitred, add each mitre	—		0	5	0	6	0	6	0	7	0	8	0	9
If feather-tongued	—		—		0	1½	0	1½	0	2	0	2	0	2
If clean deal in dresser tops	—		—		—		0	1½	0	1½	0	2	0	2

Skylights—per ft. super.

	1½ in.		2 in.	
	s.	d.	s.	d.
Deal ovolo or bevelled bar	0	10½	1	1
For every half inch extra thickness add per ft. sup.	0	3	0	3

Fanlights—per ft. super.

	1½ in.		2 in.		2½ in.	
	s.	d.	s.	d.	s.	d.
Deal square framed	0	11	1	1	1	3
„ semi-head measured square ..	2	0	2	2	2	4

Skirtings, including Backings—per ft. super.

	⅝ in.		1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Square	0	7	0	8	0	9	0	10
Torus or single moulded ..	0	8	0	10	1	0	1	2

If rebated to form double plinth, add per foot, 2*d*.
If raking to steps .. .. .. „ 2*d*.
If plugged to walls .. .. .. „ 1½*d*.
If scribed .. .. „ 1½*d*.
Narrow skirting grounds .. .. per foot run, 2½*d*.

SASHES, FRAMES, AND CASEMENTS—per ft. super.

	Deal Sashes.				Wainscot or Honduras Sashes			
	1½ in.		2 in.		1½ in.		2 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Deal-cased frames, oak-sunk and weathered sills, ovolo sashes, brass-cased pulleys, best flax lines and iron weights single hung ..	1	6	1	9	2	5	3	0
If double hung, add per foot	0	2	0	2	0	3	0	3
Circular head, measured square	3	3	3	9	5	3	5	9
Circular on plan, add per ft.	1	0	1	6	2	0	2	0
If astragal and hollow sashes, add	0	1	0	1	0	2	0	2
If lamb's tongue or other special moulding, add per foot	0	2	0	2	0	3	0	3
Marginal bars, extra per foot run	0	1½	0	2	0	2	0	2
Frames, &c., as described above, for Venetian windows	2	2	2	8	3	6	4	2
Casements, including fir "proper" frames, oak-sunk w. and t. sills, but no butts	2	0	2	3	3	4	3	6
	2 in.		2½ in.		2 in.		2½ in.	
Sashes only for shop windows, ovolo	1	0	1	2	1	8	2	0
Circular on plan	1	6	1	8	2	4	2	8
If astragal and hollow, add per foot	0	2	0	2	0	3	0	3
If lamb's tongue or special moulding	0	4	0	4	0	5	0	5
Cant bar, per foot run	1	0	1	0	1	6	1	6
Moulded horns, each	0	7	0	7	0	10	0	10

Venetian Blinds, painted and fixed complete, per foot super. 8d. to 1s.

Bullivant's Patent Sliding Sashes, 2 in. deal, moulded, with deal-cased frames, d, r, and t cills, including brass fixing screws, iron nuts, guide-bars plated with zinc and springs at back, per foot super. from bench, 1s.

BACK LININGS—per ft. super.

	1 in.		1½ in.	
	s.	d.	s.	d.
Deal, 2 or 3 panel square	1	1	1	3
„ bead butt, or 4-panel square ..	1	2	1	5
„ 4 panel and bead butt	1	3	1	6
For extra panel, add per foot	0	1	0	1
If splayed „	0	1½	0	1½

BACKS, ELBOWS, SOFFITS—per ft. super.

	1 in.	1½ in.
	s. d.	s. d.
Deal plain keyed	1 1	1 3
Square framed	1 3	1 6
Moulded or bead butt	—	1 8
Fancy moulded	—	1 9
Soffit, square framed, circular one edge	—	2 0
„ moulded or bead butt	—	1 9
„ fancy moulded	—	2 6
„ circular, two edges	—	2 6
If splayed, add per foot	—	0 2
Plain circular soffit, canvas-backed	—	3 6
Semicircular moulded soffit, 2 panels	—	5 6

Capping to backs .. .. per foot run, 3d.
Add, if tongued .. .. „ 1d.
Tongued elbow capping „ 10d.

BOXINGS—per ft. super.

	1 in.	1½ in.
	s. d.	s. d.
Deal, splayed	1 0	1 2
„ proper boxings	1 1	1 4
„ circular on plan	—	2 0
„ for sliding shutters double hung with pulleys, beads, fillets, &c.	1 2	1 4

BOXING SHUTTERS—per ft. super.

	⅝ in.	1 in.	1½ in.	1½ in.
	s. d.	s. d.	s. d.	s. d.
Deal clamped flaps hung in one height	0 11	1 0	1 1½	1 3
Two-panel square ditto	—	1 3	1 5	1 6
Bead butt or moulded, one side, ditto	—	1 4	1 6	1 7
If hung in two heights add per foot	—	0 1½	0 1½	0 1½
Four-panel square in two heights	—	1 6	1 7½	1 9
Ditto, moulded one side	—	1 8	1 9½	1 11
For extra panel, add per foot	—	0 1½	0 1½	0 1½
If splayed .. „	—	0 1	—	0 1

Shop Shutters—per ft. super.

	s.	d.
1¼ bead butt and square shop shutters	1	6
1½ bead butt and moulded	1	9
2¼ moulded stall board	2	0

Patent Revolving Shutters.

	s.	d.		s.	d.
Wood, fixed complete	1	6	to	2	6
Wood, and iron edge, complete	3	0	„	—	
Flat laths, iron and all gearing	3	6	„	4	6
Self-coiling, steel	2	6	„	3	6
Mahogany or oak	3	6	„	6	6

Space occupied by Revolving Shutters.

Sight Height of Shutter.	Diameter of Curvilinear and Interlocking Iron Shutters.	Diameter of Wood and Iron Flat Lath Shutters
5 feet	6¾ inches	9½ inches
8 „	8 „	11 „
10 „	9 „	12½ „
15 „	10¾ „	14¾ „
20 „	13 „	17 „

The above is net size of shutters. 1 to 2 inches clearance should be allowed.

Sliding Shutters—per ft. super.

Including lines, weights, &c.

	1 in.		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.
Deal, two-panel square	1	4	1	6	1	8
Ditto, moulded or bead butt one side	1	6	1	8	1	10
Ditto, bead flush and square	1	7	1	9	1	11
If hung with lead weights, add per ft.	0	3	0	3	0	3

Cupboards and Dressers—per ft. super.

Measured on Face.

	s.	d.
1-in. deal tops, square skirting ¼-in. shelf, 1¼-in. moulded and square folding doors hung to beaded frame	2	9
2-in. tops, 3 shelves, 3 drawers, pot-boards, framed legs and ends, 1 ft. 6 in. deep	3	3

Doors—per ft. super.

	Deal.					Wainscot and Honduras.	
	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Rough ledged, edges shot ..	0 8	0 9	0 10	0 11	—	—	—
Wrought ditto	0 10	0 11	1 0½	1 3	—	—	—
Matched and beaded	0 11½	1 1	1 2	1 5	—	—	—
Ploughed, tongued, and beaded	—	1 2	1 3	1 6	—	—	—
If braced, add	0 2	0 2	0 2	0 2	—	—	—
Two or three panel sqr. ..	—	1 0	1 1	1 2	1 4	—	—
Four-panel square	—	1 2	1 3	1 4	1 6	3 2	4 0
Ditto, moulded or bead butt one side	—	1 3½	1 5	1 6	1 8	3 6	4 4
Six-panel square	—	—	—	1 5	1 8	3 8	4 6
Ditto, moulded one side ..	—	—	—	1 7	1 10	3 11	4 9
Ditto, bead flush and square	—	—	—	1 8	1 11	4 0	4 10
Ditto, moulded both sides ..	—	—	—	1 9	2 0	4 2	5 0
Framed, braced, and filled in with 1-in. ploughed and tongued boards	—	—	—	—	2 0	—	—
Wrought, ploughed, and tongued cellar flaps ..	—	—	—	1 6	1 10	—	—

For Spanish mahogany add 50 per cent. to price of Honduras.

Door and Window Frames—per ft. run.

	Deal.	Mahogany.	Oak.
	s. d.	s. d.	s. d.
4 in. × 3 in. wrought, rebated and beaded frame ..	0 6	1 6	0 11
5 in. × 3 in. „ „ ..	0 7	1 10	1 2
5 in. × 4½ in. „ „ ..	0 11	2 8	1 10
6 in. × 4½ in. „ „ ..	1 0	3 0	2 0

Sash Doors—per ft. super.

	Deal.		Wainscot and Honduras.	
	1½ in.	2 in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.
Ovolo two-panel square ..	1 3	1 5	3 0	3 6
Ditto, and moulded or bead butt one side	1 4½	1 6½	3 3	3 10
Ditto and ditto, both sides..	1 6	1 8	3 7	4 4
If diminished styles .. add	0 1	0 1	0 2	0 2
If lamb's tongue .. .. „	0 1½	0 1½	0 2	0 2
If hung folding .. .. „	0 2	0 2	0 3	0 3
If with marginal lights „	0 2	0 2	0 3	0 3

JAMB LININGS—per ft. super.

	⅝ in.	1 in.	1¼ in.	1½ in.
	s. d.	s. d.	s. d.	s. d.
Deal, single rebated	—	0 10	0 11½	1 1
Ditto, and beaded..	—	0 11	1 0½	1 2
Ditto, double rebated	—	0 11½	1 1	1 2½
Ditto, and beaded..	—	1 1	1 2	1 3½
Two-panel, single rebated ..	—	—	1 2	1 4
Ditto, and moulded	—	—	1 4	1 6
If double rebated .. add	—	—	0 1	0 1
If plugged to walls .. „	—	—	0 1	0 1
If splayed .. .. .. „	—	—	0 1	0 1
Framed grounds, per ft. sup.	0 9	0 10	0 11	1 1

WALL LININGS AND PARTITIONS—per ft. super.

	1 in.	1¼ in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.
Square framed	0 10	0 11	1 0	1 1½
Moulded one side	0 11½	1 0½	1 2	1 3½
Ditto, two sides	1 1½	1 2½	1 4½	1 6

WATER-CLOSETS—per ft. super.

	Deal.		Honduras.	
	1 in.	1¼ in.	1 in.	1¼ in.
	s. d.	s. d.	s. d.	s. d.
Tongued seat-riser and bearers	1 0	1 1	2 6	2 10
Ditto, framed and beaded with clamped flap	1 2	1 4	3 0	3 6
Cutting and dishing holes, each	1 0	1 0	1 6	1 6
Ditto, for pull, including beads .. ..each	—	—	2 0	2 0

STAIRCASES—per ft. super.

	1 in.	1¼ in.	1½ in.	2 in.
	s. d.	s. d.	s. d.	s. d.
Wrought deal treads, risers, and carriages	1 2	1 4	—	—
Ditto, glued and blocked with moulded nosings	1 4	1 6	—	—
Ditto, with returned nosings	1 6	1 9	—	—
Add on winders	0 1½	0 2	—	—
Plain cut brackets, each, 1s. 2d.				
Housings to step and riser, each, 10d.				
Plain wall string and plugging	0 10	0 11½	1 2	1 5
Ditto, wreathed	3 10	4 8	5 8	6 6
Moulded ditto .. .. add	0 2	—	—	—
Ditto, wreathed .. .. „	0 4	—	—	—
Framed, rebated, and beaded outer string	1 0½	1 2	1 4	—
Ditto, sunk and beaded ..	1 1	1 4	1 6	—
Ditto, moulded	1 2	1 5	1 8	—

MOULDINGS—per ft. super.

	s.	d.
Straight, worked by hand	1	9
Circular on plan, ditto	3	0
Ditto, heads, ditto	4	6
Ditto, two ways, ditto	9	6

MOULDINGS UNDER 4-IN. GIRTH—per yard run.

	½ in.		⅝ in.		¾ in.		⅞ in.		1 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Common o.g.	0	1½	0	2½	0	3	0	3½	0	4
Quirked ditto	0	1½	0	3	0	3½	0	4	0	5
Quirk ovolo and bead	0	2	0	3½	0	4	0	4½	0	6

HANDRAILS—per ft. run.

	Deal.		Oak or Honduras.		Spanish Mahogany.	
	s.	d.	s.	d.	s.	d.
Moulded, 2½ in. × 2 in. ..	1	0	2	3	3	6
Grooved for balusters	1	1	2	4	3	9
Ramped	2	3	4	0	5	6
Swan-neck	3	0	5	3	7	6
Solid writhed..	4	8	10	0	13	6
Scroll to curtail step	—		10	0	14	6

Birch twice the price of deal.

French polishing rail .. .. .. per foot run 6*d.*
Balusters, 1 in. square bar.. .. „ 2*d.*
Turning extra, from 6*d.* each.

CASINGS, FACIAS, &C., DEAL.

	1 in.	1¼ in.	1½ in.
Wrought casings .. .. per ft. super.	7½*d.*	8*d.*	9*d.*
„ cross tongued .. .. .. „	8½*d.*	9*d.*	10*d.*
„ ledged and slot screwed .. „	10½*d.*	11*d.*	1*s.* 0*d.*

HONDURAS MAHOGANY.

Casings and facias	1*s.* 9*d.*	2*s.* 0*d.*	2*s.* 3*d.*
„ ledged and slot screwed	2*s.* 1*d.*	2*s.* 4*d.*	2*s.* 7*d.*

PIPE CASING.

¾ in. narrow casing .. .. per ft. run	7*d.*
„ „ with two grounds .. .. „	10*d.*
1 in. „ „ „ .. .. „	10½*d.*
¾ in. wide casing, with two rebated and beaded grounds .. .. per ft. super.	11*d.*
1 in. „ „ „ .. .. „	1*s.* 0*d.*

ELECTRIC WIRE CASING.

¾ in. × 1½ in. wrought and chamfered .. .. per ft. run	2½*d.*
¾ in. × 2½ in. „ „ .. .. „	3*d.*
1 in. × 2 in. „ „ .. .. „	3*d.*
1 in. × 2½ in. „ „ .. .. „	3½*d.*
1 in. × 2½ in., moulded .. .. „	3½*d.*
1 in. × 3 in. „ .. .. „	4*d.*

SUNDRIES.

		s.	d.
Cut brackets for shelves, 9 in. wide	each	1	0
Ditto, moulded ditto	„	2	0
Cloak pegs and turning	„	0	6
Small deal paper boxes	„	3	0
Fixing cupboard locks or latches	„	0	10
Ditto deadlocks	„	0	11
Ditto mortise locks	„	3	0
Ditto patent sash fasteners	„	0	9
Ditto common bolts	„	0	5
Ditto shutter bars	„	1	0
Towel rollers and brackets	„	5	0
Harness pegs in hard wood	„	0	9
Saddle brackets	„	20	0
Sash line	per yd.	0	1
Sash weights (iron)	per lb.	0	1½
Ditto (lead)	„	0	3
White lead	„	0	4
Pitch	„	0	1
Tar	per gall.	0	8

STEAM-MADE JOINERY.

Prices at the Warehouse in London.

DEAL.	Per 100 foot run. s.	d.
5 in. × 3½ in. rebated and double-beaded door frame	38	6
4½ in. × 2¾ in. ditto	26	5
3½ in. × 1½ in. architrave moulding	12	7
3 in. × ⅞ in. ditto	8	7
2 in. × 1 in. ditto, moulding	6	7
1 in. × ½ in. panel moulding	2	11
6½ in. × 1¼ in. architrave	26	0
4½ in. × ⅝ in. torus or moulded skirting	9	8
7 in. × ⅝ in. torus skirting	14	6
7 in. × 1 in. moulded ditto	15	0
11 in. × 1 in. moulded and sunk	30	0
	per ft. sup.	
Double hung sashes and frames complete	8d. to 10d.	

Steam-made Joinery.

Prices at the Warehouse in London—*continued.*

		s.	d.		s.	d.
1¼-in. four-panelled square framed doors, 6 ft. 7 in. × 2 ft. 7 in. ..	each	8	6	to	11	3
2-in. do., do., 6 ft. 8 in. × 2 ft. 8 in.	„	11	6	„	14	4
1¼-in. four-panel bead butt or flush doors, 6 ft. 8 in. × 2 ft. 8 in. ..	„	11	10	„	13	2
2-in. ditto, ditto	„	17	4	„	18	8
2-in. four-panel moulded doors, 7 ft. × 3 ft.	„	14	0	„	15	5
1¼-in. sash doors, ditto, 6 ft. 8 in. × 2 ft. 8 in.	„	17	4	„	18	2
2-in. ditto, ditto, 7 ft. × 3 ft. ..	„	20	4	„	21	2
Jamb linings, 4½ in. × 1 in. to 6½ in. × 1½ in.	„	10	6	„	20	0

	Per ft. sup.
	s. d.
Trellis work..	0 7
	for each 9 ft. length.
Fence posts, 9 ft. apart, 3 rails and upright bars, height 4 ft.	13 6
Ditto, ditto, height 3 ft. 6 in.	11 0

Greenhouses Complete.

Including fixing, sashes 2 in. thick, glazed with 16-oz. sheet glass.

		£	s.	d.
Lean-to houses,	15 ft. × 6 ft.	16	10	0
„ „	20 ft. × 10 ft.	30	10	0
„ „	30 ft. × 12 ft.	48	0	0
„ „	50 ft. × 14 ft.	76	0	0
Span houses,	15 ft. × 12 ft.	33	0	0
„ „	20 ft. × 16 ft.	49	10	0
„ „	30 ft. × 20 ft.	76	0	0
„ „	50 ft. × 20 ft.	114	0	0

Wholesale Price List of American White Pine Doors.

Dimensions. Width.	Dimensions. Height.	Thickness.	Description.	Brands. ✠	Brands. ♦	Brands. ★
ft. in.	ft. in.	in.	*Inside Doors.*	s. d.	s. d.	s. d.
2 4 ×	6 4	1¼	Moulding on solid—two sides ..	6 7	7 7	8 6
2 6 ×	6 6	1¼	Ditto	7 2	8 2	9 1
2 8 ×	6 6	1¼	Ditto	8 0	9 0	9 11
2 6 ×	6 6	1¼	Ditto	8 2	9 2	10 1
2 8 ×	6 8	1¼	Ditto	9 3	10 3	11 2
2 8 ×	6 8	1¾	Ditto	11 10	12 10	13 9
2 6 ×	6 6	1¼	Flush Moulding one side, Raised Pan one side	7 11	8 11	9 10
2 8 ×	6 6	1¼	Ditto	8 10	9 10	10 9
2 8 ×	6 8	1¼	Ditto	9 1	10 1	11 0
2 6 ×	6 6	1¼	Flush Moulding two sides	—	11 0	11 11
2 8 ×	6 6	1¼	Ditto	—	11 3	12 2
2 8 ×	6 8	1¼	Ditto	—	11 6	12 5
2 10 ×	6 10	1¼	Ditto	—	12 5	13 4
3 0 ×	7 0	1¼	Ditto	—	13 5	14 4
2 8 ×	6 8	1¾	Ditto	—	14 4	15 3
2 10 ×	6 10	1¾	Ditto	—	15 8	16 7
3 0 ×	7 0	1¾	Ditto	—	16 8	17 7
3 0 ×	7 0	2	Ditto	—	17 8	18 7
			Back Doors.			
2 8 ×	6 8	1¾	Flush Moulding one side, Bead and Butt one side ..	—	18 5	19 4
3 0 ×	7 0	1¾	Ditto	—	19 9	20 8
			Front Doors.			
2 10 ×	6 10	1¾	Bolection Moulding one side, Flush Moulding one side	—	—	22 0
2 10 ×	6 10	2	Ditto	—	—	23 0
3 0 ×	7 0	1¾	Ditto	—	—	23 9
3 0 ×	7 0	2	Ditto	—	—	25 0

Deal School Fittings.

		s. d.
Plain desk	per ft. run	1 5
Standards to ditto	.. each	2 8
Seat	per ft. run	0 8
Standard to ditto	.. each	1 5
Blocks for ditto	.. „	0 10
Double desk	per ft. run	3 0
Standards and block	.. each	5 3
Seats with back rails	per ft. run	2 2 to 3 6

DEAL SCHOOL FITTINGS—*continued.*

"LONDON" and other pattern SCHOOL FITTINGS, including Desk-top, 14 in. wide; shelf, 7 in.; seat, 9 in.; two standards to each:

	Stained Deal.	Pitch Pine.
	s. d.	s. d.
2 ft. long, for one scholar .. .. each	19 0 to 23 0	20 0 to 25 0
3 ft. 4 in. long, for two scholars „	21 0 „ 25 0	22 6 „ 28 0
6 ft. long .. .. „	26 0 „ 30 6	28 0 „ 32 0
Three standards each		
9 ft. long	34 0 „ 45 9	37 0 „ 48 0
12 ft. „	47 0 „ 52 0	51 0 „ 55 0

	9 in. wide.	11 in. wide.
	s. d.	s. d.
Stained deal forms—		
With single rail .. .. per foot	1 0	1 2
„ double rail .. .. „	1 2	1 4
Lecture Hall seats—		
Deal, stained and varnished .. .. per foot		1 6
Pitch pine, varnished.. .. .. „		1 9
Standards .. .. each		4 0
Screws ditto .. .. „		0 4

GEARY'S PATENT WOOD BLOCK FLOORING.

The following prices are *approximate only*. Special quotations will be given on receipt of particulars (and plan where convenient).

	1 in.	1½ in.	1¾ in.	2 in.
	s. d.	s. d.	s. d.	s. d.
* A.—				
Red or yellow deal ..	—	5 3	5 6	6 6
Pitch pine	—	6 9	6 3	7 3
Oak	8 6	9 6	10 6	12 6
† B.*—				
Red or yellow deal ..	—	6 0	6 3	7 3
Pitch pine	—	6 6	7 0	8 0
Oak	9 6	10 6	11 6	13 6
‡ C.—				
Red or yellow deal ..	—	6 0	6 6	7 6
Pitch pine	—	6 6	7 0	8 0
Oak	9 6	10 6	11 6	13 6

Per super. yard, laid complete, exclusive of concrete.

B* includes "labour" of "floating" in cement.

A. Blocks are dovetail, grooved and bedded in an adhesive mastic.

† B. Each block secured from beneath with metal keys dovetailed into the blocks, which are grooved same as A.

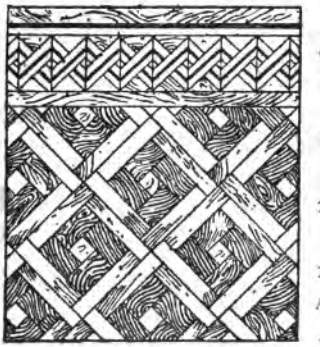
‡ C. The blocks are tongued or dowelled together (see advertisement on adjoining page.)

THE WOOD BLOCK Flooring Co

SECTIONS

WOOD BLOCK : PARQUET : MOSAIC.

CONTRACTORS TO H.M. WAR DEPARTMENT, ADMIRALTY, OFFICE OF WORKS, &c.



Special quotations, designs, &c., given on receipt of plan and particulars.

Telegrams: "Edaphos, London."

Telephone 15074.

Manchester Office: 46A *Market St.*

For DESIGNS and PRICES see Architect's Compendium.

11 Queen Victoria St. LONDON E.C.

See Prices (approximate only) opposite. [*To face p. 2*

MAKERS TO HER MAJESTY THE QUEEN.

MAKERS TO THE BANK OF ENGLAND

BY SPECIAL APPOINTMENT.

HOBBS, HART & Co., LTD

PATENTEES AND MANUFACTURERS OF

HOBBS & Co.'S LEVER "MACHINE MADE PATENT "PROTECTORS" **LOCKS**

EXTENSIVE MASTERSHIPS A SPECIALITY.

HOBBS & Co.'S MORTISE RIM FRONT DOOR STABLE, LAVATORY **LATCHES**

HOBBS & Co.'S "PROGRESS" "PROTECTORS" SEAMLESS STEEL FIRE, FALL AND BURGLAR-RESISTING **SAFES**

HOBBS & Co.'S SELF-CONTAINED STEEL BANKERS' AND MERCHANTS' **STRONG-ROOMS**

STRONG-ROOM AND PARTY-WALL DOORS.

SHOWROOMS: 76 CHEAPSIDE, E.C.

GENERAL OFFICES AND WORKS: [illegible]TON ST., ISLINGTON, N.

IRONMONGER.

		⅝ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Screws, iron ..	per doz.	0 1	0 2	0 3	0 4	0 4½	0 6
Ditto, brass ..	„	0 3	0 5	0 7	0 8	0 9	0 10

	Per Pair.							
	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Hinges, including screws, cast iron	0 2	0 3	0 4	0 6	0 8	0 9	1 0	2 0
Ditto, wrought iron	0 3	0 4	0 6	0 8	0 10	1 0	1 9	3 0
Ditto, brass ..	0 6	0 8	0 9	1 0	1 6	2 0	4 0	8 0
Brass rising butts	—	—	—	—	—	10 0	14 0	18 0

PRIME COST DOOR SPRINGS AND HINGES.

	Iron.	Brass.
	s. d.	s. d.
Springs, 3 in.	13 6	22 0
„ 4 in.	18 0	29 0
„ 5 in.	24 0	38 0
„ 6 in.	30 0	47 0
Hinges, single action, 3 in.	13 0	27 0
„ „ 4 in.	17 6	36 0
„ „ 5 in.	22 0	44 0
„ „ 6 in.	27 6	52 0

Cross garnets, 10 in., 9*d.*; 16 in., 1*s.* 8*d.*; 20 in., 2*s.* 6*d.* per pair.
Parliament, 3½ in., 1*s.* 9*d.*; 4 in., 2*s.*; 5 in., 2*s.* 6*d.* per pair.
Collinge's patent, 18 in., 7*s.*; 24 in., 10*s.*; 30 in., 13*s.* per pair; not fixed, 4 ft. long, 27*s.*
Wedge Casement Stays, 12 in. arm, 2*s.* 6*d.* each fixed.
Bolts, iron, 3 in., 4*d.*; 6 in., 8*d.*; 10 in., 1*s.* 6*d.*, fixed.
Espagnolette, ditto, 3*s.* 3*d.* to 4*s.* per foot run; nett cost, add profit and fixing.
Shutter bar with bow latches, per inch in length, 1½*d.*
Plain brass knobs and roses, each, 3*d.*
Brass flush rings, each, 6*d.*
Common sash fasteners, each, 1*s.*; strong patent, 7*s.* 6*d.*
Flax line per yard, 2*d.*
Carpenter and Joiner, day work, per hour, 11½*d.*

	s.	d.
Hookham's patent steel ribbon Sash Line—		
Breaking strain, 3 cwt. .. .. .. per foot	0	3
„ 4½ cwt. .. .. .. „	0	4
„ 7 cwt. .. .. .. „	0	5
Gothic drop-ring Handle, each .. .. from	2	0
„ Latch or Bolt .. .. „	4	6
Brass perforated Finger Plates .. .. „	12	6
„ art design.. .. .. „	20	0

FRENCH CASEMENT BOLTS.

Price list per bolt of (2 metres) 6 feet 6¼ inches long.

	⅝ Inch Half-round.				¾ Inch Half-round.				Extra Lengths per Foot.	
	Mark B.		Mark R. G.		Mark B.		Mark R. G.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
All iron	1	6	1	11	1	10	2	3	0	3
Iron with brass knob	3	0	3	5	3	3	3	9	0	3
Iron and brass fittings	8	0	8	9	9	3	10	3	0	3
All brass	13	6	15	0	14	3	16	3	1	0

Robert Adams' "Empress Victor" Patent Pneumatic Overhead Silent Check Door Spring.

	s.	d.
No. 183, for doors not exceeding 2 ft. 6 in. wide by 1¼ in. ..	20	0
No. 182, „ „ „ 2 ft. 8 in. „ „ 2 in. ..	25	0
No. 181, „ „ „ 3 ft. 6 in. „ „ 3 in. ..	30	0
No. 180, „ „ „ 4 ft. 0 in. „ „ 3 in. ..	35	0

Robert Adams for approved sections of metal casements and frames of all kinds. Prices on receipt of particulars.

"Impregnable" Combined Bolt and Stay (Arthur W. Adams' Patent).

	Brass.		Iron.
Opening out, No. A141	27s. 6d.	..	15s. 6d.
Opening in, No. A142	30s. 0d.	..	17s. 6d.

With key to Lock, 2s. 6d. extra. With handles both sides, 2s. 6d. extra.

Robert Adams' Original Patent Spring Hinge with Adjustable Shoe Stop Centre.

	s.	d.
No. 6.—Plate 7 in. wide by 5¼ in. Shoe, 1 in. to 1¼ in. ..	24	0
No. 5.— „ 7 „ „ 5¼ „ „ 1¼ „ 2¼ „ ..	27	6
No. 4.— „ 7½ „ „ 6 „ „ 1½ „ 2½ „ ..	31	6
No. 3.— „ 7 „ „ 7¼ „ „ 2⅜ „ 3 „ ..	37	0
No. 2.— „ 8¼ „ „ 7¼ „ „ 2⅜ „ 3 „ ..	42	0
No. 1.— „ 9¼ „ „ 8⅜ „ „ 2⅜ „ 3 „ ..	50	0

Robert Adams' Patent "Triumph" Sash Fastener.

	1¼ in.		2 in.		2½ in.		3 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Malleable Iron, Coppered ..	1	3	1	4	1	5	1	6
Brass, Polished	2	6	2	8	2	10	3	0

Robert Adams' Patent "Climax" Reversible Window Fittings for new or existing sliding windows.

For sashes up to 4 feet high, 3*s.* 6*d.* per set per sash.
„ over 4 „ „ 4*s.* 6*d.* „ „

Robert Adams' Patent Triple Action Casement Bolts, half-round section, for French Casements, effectually prevent Casements warping or winding. Prices—½ Bolts for Casements up to 6 ft. high, brass mounts and enamelled Iron Bolts, 31*s.* 6*d.* each; all Brass, 39*s.* 6*d.* Exceeding 6 ft., Iron Bolts, add 6*d.* per ft.; Brass Bolts, 1*s.* 6*d.* per ft.

Double Action, up to 6 ft. high.

	½	¾	1
All iron, bronzed	6*s.* 0*d.*	7*s.* 0*d.*	10*s.* 0*d.* each.
Brass Handle	8*s.* 6*d.*	9*s.* 6*d.*	12*s.* 6*d.* „
„ Mounts	15*s.* 0*d.*	16*s.* 0*d.*	20*s.* 0*d.* „
All brass	20*s.* 0*d.*	25*s.* 0*d.*	28*s.* 0*d.* „

Above 6 ft., iron, 6*d.* per foot; brass, 1*s.* 6*d.* per foot.

Robert Adams' New Patent Solid Brass Tongued Weatherproof Secure Casement Bolt, No. 190, 4*s.* per foot, from 5 ft.

No. 17, Rd. Espagnolette, or No. 208, "Thrust Motion" Bolt, for Casements with very narrow stiles.

In brass, ¾ in. 3*s.* 4*d.*, ⅞ in. 4*s.*, and 1 in. 5*s.* 3*d.* per foot.

Lengths under 5 ft. charged as 5 ft.

No. 11. Triple Bolt, for Entrance Gates, 6 ft. long, 50*s.* each; smaller, for Bank and other doors, 40*s.* each; extra length, 1*s.* per foot. With automatic lever lock, unpickable and unforcible. *See* the "Impregnable," (Arthur W. Adams' Patent.)

Robert Adams' New "Patent Victor" Casement Stay.

Opening Inwards.		Opening Outwards.	
Bronzed Iron.	Brass.	Bronzed Iron.	Brass.
No. 204, 10 in. 2*s.*	No. 202, 3*s.*	No. 193, 10 in. 2*s.*	No. 191, 3*s.*
„ 205, 12 in. 2*s.* 4*d.*	„ 203, 4*s.* 6*d.*	„ 194, 12 in. 2*s.* 4*d.*	„ 192, 4*s.* 6*d.*

Casements and Frames, No. A. 1, wrought-iron impervious section, with condensation channel (Arthur W. Adams' patent). Guaranteed efficient and strong.

Including Hinges, Fasteners and Stays.

	2·0	2·6	3·0	3·6	4·0	4·6	5·0	5·6	6·0
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Opening out	27 6	28 0	31 0	32 6	34 0	47 6	49 0	51 6	53 0
Opening in	28 6	29 0	32 6	34 0	35 6	49 0	51 0	53 0	55 0

Fanlights and Ventilators of this system at proportionately low prices.

Robert Adams' Patent Simultaneous Opening Gear with self-sustaining Screw and Regulator, for Lantern Lights, Skylights, Conservatories, Greenhouses, &c.

With direct Vertical Screw Rod, No. 86.

Sashes opened.	One.	Two.
	s. d.	s. d.
2 ..	28 0 ..	33 0
3 ..	35 0 ..	43 0
4 ..	42 0 ..	53 0
5 ..	55 0 ..	78 0
6 ..	63 0 ..	88 0

With 6 ft. Ceiling Connecting Bar and Fittings, No. 76.

Sashes opened.	One.	Two.
	s. d.	s. d.
2 ..	44 6 ..	50 0
3 ..	51 6 ..	60 0
4 ..	58 6 ..	70 0
5 ..	71 6 ..	85 0
6 ..	80 0 ..	95 0

Special prices for longer lengths or heavier work. If the Sashes are placed at intervals, add 1*s.* 6*d.* per foot of Horizontal Bar, between the Sashes opened. Vertical Rods over 6 feet, 6*d.* per foot extra. Connections (No. 76) 9*d.* per foot beyond 6 feet.

Robert Adams' Patent Fanlight Opener, with self-sustaining Screw and Regulator.

No of Sashes opened.	Bronzed Iron.	Iron Rods, Brass Regulators.		All Brass Polished, best lacquered.	
		Slow Speed.	Quick Speed.	Slow Speed.	Quick Speed.
	s. d.	s. d.	s. d.	s. d.	s. d.
1 ..	12 0 ..	16 0 ..	18 6 ..	30 0 ..	32 0
2 ..	18 0 ..	25 6 ..	28 0 ..	48 0 ..	50 6
3 ..	26 0 ..	33 6 ..	35 6 ..	62 6 ..	65 0
4 ..	32 0 ..	41 6 ..	44 0 ..	70 6 ..	73 0

Rods over 6 ft. Iron, add 6*d.* per ft. extra, Brass, 2*s.* per ft. extra. When the Fanlights are extra large and heavy, it is recommended that not more than two at a time be opened with this apparatus, and that an Auxiliary Spring Stay to each Fanlight be used; Auxiliary Spring Stays for heavy lights 7*s.* 6*d.* each extra.

When the Fanlights are of unusual size, and not adjoining each other or separated by wide or deep mullions, the Horizontal Bar apparatus traversing the width of the Fanlights No. 75 is only suitable.

If with Secret Folding Stays, add 2*s.* each extra.

"Ratchett" Fanlight Adjustment for Lights opening in.

To work with long arm.

	s. d.
6 in. Stay	5 0 each.
9 in. „	6 6 „
12 in. „	8 0 „

To work with and including cords add 2*s.* 6*d.* each.

"Ratchett," for Lights opening out.

To work with cord, including cord.

6 in. Stay, 8s., 9 in. Stay, 9s. 6d., 12 in. Stay, 11s.

Robert Adams' Patent "Scott" Rack and Wheel Fanlight and Skylight Cord Adjustments.

For Fanlights.

		Malleable Iron.	Gun Metal. Polished.
No. 163.	Opens 10 in.	2s. 11d.	4s. 4d. / 6s.
No. 164.	„ 15 in.	4s. 6d.	6s. 3d. / 8s. 6d.
No. 165.	„ 18 in.	8s. 6d.	— / 17s. 6d.

For Skylights.

			Malleable Iron.	Gun Metal. Polished.
	No. 166.	Opens 10 in.	3s. 10d.	— / 7s. 6d.
	No. 167.	„ 15 in.	5s. 0d.	— / 9s. 6d.
	No. 168.	„ 18 in.	9s. 6d.	— / 19s. 6d.
Extra Power	No. 196.	„ 10 in.	4s. 0d.	5s. 8d. / 9s. 6d.
	No. 197.	„ 15 in.	5s. 9d.	7s. 9d. / 12s. 9d.
	No. 198.	„ 18 in.	10s. 0d.	— / 24s. 0d.

Cords to suit, extra.

The "Crown Victor" Double Action Floor Spring Hinges, for Swing Doors.

With Check.—Quality.

	For Doors not over	B	C	D	E	F
		s. d.	s. d.	s. d.	s. d.	s. d.
No. 335.	6 ft. by 1 ft. 9 in. by 1¼ in. ..	30 0	31 0	31 6	32 0	33 0
„ 336.	7 ft. 6 in. by 2 ft. 6 in. by 2½ in.	40 0	41 0	41 0	42 0	44 0
„ 337.	For extra large or heavy doors	60 0	62 0	62 0	63 0	66 0

Without Check.—Quality.

	For Doors not over	B	C	D	E	F
		s. d.	s. d.	s. d.	s. d.	s. d.
No. 330.	6 ft. by 1 ft. 9 in. by 1¼ in. ..	20 0	21 0	21 6	22 0	23 0
„ 331.	7 ft. 6 in. by 2 ft. 6 in. by 2½ in.	30 0	31 6	31 6	32 0	34 0
„ 332.	For extra large or heavy doors	40 0	41 0	42 0	43 0	46 0

Special non-freezing and non-corrosive oil and cans extra.

Quality B is with iron strap shoe and top centre.

C is with brass shoe and top centre.

D is with iron universal adjustable shoe and top centre.

E is with brass adjustable shoe and top centre.

F is with fittings as E, and steel faced.

Quality F is supplied unless otherwise specified.

Any other quality than F can be steel faced at an extra cost of 1s., 2s., and 3s. each respectively.

"London Victor" Single Action Floor Springs for Rebated Doors.
With the Hydraulic Positive Silent Check.

	For Doors not over	With Check.—Quality. G s. d.	H s. d.	I s. d.
No. 340.	6 ft. by 1 ft. 9 in. by 1½ in.	23 0	24 0	25 0
„ 341.	7 ft. 6 in. by 2 ft. 6 in. by 2½ in...	33 0	34 0	35 0
„ 342.	For extra large or heavy doors ..	37 0	43 0	49 0

Extra strong and steel faced.

	For doors not over	Quality. G s. d.	H s. d.	I s. d.
No. 350.	6 ft. by 1 ft. 9 in. by 1½ in.	27 0	28 0	29 0
„ 351.	7 ft. 6 in. by 2 ft. 6 in. by 2½ in...	39 0	40 0	41 0
„ 352.	For extra large or heavy doors ..	53 0	54 0	55 0

Steel-faced washer butts for top centres, 2s. each extra.

Quality G with iron strap shoe.

Quality H with brass knuckle shoe.

Quality I with brass adjustable knuckle shoe.

Special non-freezing and non-corrosive oil and cans extra.

Robert Adams' Patent "Triumph" Secure Fanlight Pivots.

No. 60, iron, 1s. per pair. No. 59, brass, 2s. per pair. Escutcheons, 6d. doz. Keys, 2d. each.

Robert Adams' Patent "Reliable" Water Bars, of Approved Pattern.

18 in.	24 in.	36 in.	48 in.	60 in.	72 in.
11/3	13/6	18/0	22/0	25/0	27/0

With latest improvement to prevent injury when stepped upon, 12s., 14s. 6d., 20s., 24s. 6d., 27s. 6d., and 29s. 6d. respectively.

"Impervious" Section. No. A 2 (Arthur W. Adams' patent), to suit Casements opening inwards and outwards, 1s. 9d. per ft. Galvanized, 2s. 6d. per ft.

"Impregnable" Entrance Door Combination Lever Locks and Bolts (Arthur W. Adams' patent), to supersede Night Latches, &c. Warranted secure against picking or forcing. Automatically self-locking.

	All Brass Polished.	Bronzed Rods.	Bronzed Iron.
Treble Fastening, No. A 61	45s.	35s.	30s. each.
Double „ No. A 62	35s.	30s.	25s. „

"Impregnable" Casement Bolts (Arthur W. Adams' patent), with Handles and Lever Locking Key for both sides of door.

	Polished Brass.	Bronzed Rods.	Bronzed Iron.
Treble Fastenings, No. A 93	27s. 6d.	20s.	17s. 6d. each.
Double „ No. A 94	25s.	17s. 6d.	15s. „

Inside handle only, no key, 5s. each less.
„ „ „ with key, 2s. 6d. each less.

Panic Door Fittings and the "Exodus" (Arthur W. Adams' patent). Approved by County Council. For Single Doors, 25s.; for Pairs of Doors, 50s.; for Swing Doors, 65s.; key for outside, 5s. extra.

Colledge & Bridgen, Wolverhampton.

2-Bolt Rim Locks, with Screws for fixing.

		6 in.	7 in.	8 in.	9 in.
2178.	Strong brass bolt double bushed ..	30/6	37/3	50/6	68/6 per doz.
2389.	Palace motion, brass bolt, solid ward	48/-	55/6	66/6	83/- „
175.	„ „ lever brass bushed	48/-	56/-	72/-	96/- „

With Screws for fixing.

		6 in.	7 in.	8 in.	
2345.	Brass bolt, 2-lever rim lock, ornamental case	42/-	50/-	72/-	„

Rim Lock.

		6 in.	
2356.	Polished brass, with screws for fixing	54/-	„

Dead Locks.

		6 in.	7 in.	8 in.	9 in.	
927.	Bushed 2-lever, brass bolt	37/6	48/-	65/-	82/-	„
930.	„ 4-lever „ strong	55/-	65/-	82/6	103/-	„

2-Bolt Mortise Locks.

		6 in.	7 in.	
817.	2-lever, gun metal, bushed, brass shifting bolt	53/6	..	„
3251.	2-lever „ „ „ ..	57/-	..	„
3259.	2-lever, brass bolt, steel follower, gun metal, bushed, cut through	75/-	96/-	„
2356.	4-lever, brass bolt, steel follower, gun metal, bushed, cut through	96/-	117/-	„
3269.	4-lever, gun metal bolts, steel follower, gun metal, superior	129/-	156/-	„

Roller Bolt Mortise.

		6 in.	7 in.	
798.	2-lever, brass bolt, gun metal, bushed, gun metal rollers, strong	87/-	108/-	„
799.	4-lever Ditto.	108/-	129/-	„

No. 101 Brass Lock and Latch Furniture.

Our original best quality.

		Per dozen sets.					
		1¼ in.	1½ in.	1¾ in.	2 in.	2¼ in.	2½ in.
101.	Rim	10/-	11/-	12/-	13/-	13/6	14/6
802/101.	Superior strong rim	17/-	18/-	20/-	21/-	22/-	24/-
803/101.	Solid cast rim	26/-	27/-	28/-	29/-	30/-	34/-

Queen Anne Brass Lock and Latch Furniture.

		1¾ in.	2 in.	2¼ in.	
172/101.	Rim	33/-	42/-	57/-	per doz. sets.

Wood Lock and Latch Furniture.

With Mace's Spindles. Ebony, Oak or Cocus.

		2 in.	2¼ in.	2½ in.	2¾ in.		
821/101.	Mortise	33/-	42/-	..	..	„	„
824/101.	Mortise	..	39/-	42/-	45/-	„	„
835/101.	Mortise	..	36/-	42/-	48/-	„	„
826/101.	Mortise	..	33/-	36/-	39/-	„	„

Note—Rim furniture 1/- per doz. less than mortise.

Patent Double-handed Plate Locks.

		6 in.	7 in.	8 in.	9 in.	10 in.	
41.	Solid brass ward, Ornamental	61/9	63/6	65/-	70/-	75/-	per dozen.

Brass Rim Locks, Polished and highly finished.

2422. 6 inch, 10/- each. Brass screws for fixing *extra*.

2405. 6 inch, 16/9; 7 inch, 20/- each. Brass screws for fixing *extra*.

FIREPROOF FLOORS.

Measures Brothers, Limited.

Approximate cost of concrete floors 6 in., thick-gaug part of heavy Portland cement to six of burnt ballast, cok or other suitable material, clean and free from dust, in steel joists, having proper wall bearings at each end, and the full margin of safety.

For larger spans to carry walls or other loads, whe girders are required, and fitting or connections are wan small floors in difficult positions—sloping roofs, &c., th cost must be added.

Floors are frequently constructed which provide a ver margin of safety. The strength should be in proportion cost. Specification should state distinctly what propor working load is to bear to the breaking load, and whether or $\frac{1}{4}$, it is very desirable to describe it clearly.

Prices given are for the London district, and include ste —one coat of paint—and are based on present prices of ma

Clear span in feet.	1 cwt. per ft.	1½ cwt. per ft. super.	2 cwt. per ft. super.
ft. in.	s. d.	s. d.	s. d.
6 0	5 8	5 9	6 2
8 0	5 9	6 0	6 9
10 0	6 0	6 3	7 3
12 0	6 7	6 9	7 9
14 0	7 2	7 4	8 5
16 0	7 8	8 2	9 3
18 0	8 7	9 2	10 7

Stuart's Patent Granolithic Paving Co.

have a unique system of fire-resisting floors.

These are constructed in their patent granolithic m They claim for it superior advantages, such as a maximum space—tremendous spans of, say, 50 feet and three inches a with no joints whatever, and eminently fireproof—immen bility and rigidity. Prices and plans submitted on applica

Banks' Patent Fireproof Construction Syndicate, L

Ventilated Floor, A and B, Solid Floor, C. Prices va 8*s.* 6*d.* to 13*s.* per yard super, according to span and weig carried. This includes steel joists, iron centres, &c., helic lathing and concrete. Hollow fireproof partition, from plaster; and solid partition, 6*s.* 6*d.*, including plaster.

"Jhilmil" Patent Metal Lathing, constructed from s thin steel, is peculiarly adapted for use in all kinds of work. Price 1*s.* per yard super., without fixing.

SLATER.

FELTS, prime cost, exclusive of Fixing.

	s.	d.
Patent Asphalte Roofing Felt .. per square foot	0	1
„ „ Sarking ditto .. „	0	0½
„ Bituminous Inodorous do. „	0	1
„ Black Ship Sheathing do., pr. sheet, 32×20	0	2½
„ Brown ditto .. .. .. „	0	3
„ Black Hair ditto .. .. „	0	3½
„ Brown Hair ditto .. .. „	0	4
Boiler or Dry Hair Felt, in sheets, 32 in. × 20 in.		
No 1, weighing 16 ounces per sheet	0	7
No. 2, „ 24 „ „	0	9
No. 3, „ 32 „ „	0	11
No. 4, „ 40 „ „	1	1
No. 5, „ 48 „ „	1	3
Ditto, in rolls, 20 yards long by 34 in. wide.		
No. 0, weighing about 30 lbs. per piece .. .. } per lineal yard	1	0
No. 1, „ „ 42 „ „	1	1
No. 2, „ „ 62 „ „	1	3
No. 3, „ „ 85 „ „	1	11

SLATING ROOFS.

	With Zinc Nails. £	s.	d.	With Copper Nails. £	s.	d.
Ladies .. .. per square	1	9	0	1	11	0
Countess .. „	1	10	0	1	12	0
Duchess .. „	1	10	0	1	12	6
Queen's or rags „	2	6	0	2	8	0
Imperials .. „	2	0	0	2	2	0
Patent .. .. „	2	5	0	2	7	0
Westmoreland „	3	7	0	3	9	0

Circular work, ⅓rd more than the above prices.
Open or half slating, ⅓th less „ „

SLATING STRIPPED AND RELAID.

	Zinc Nails. s.	d.	Copper Nails. s.	d.
Ladies .. .. .. per square	10	0	11	6
Countess .. .. .. „	8	6	10	6
Duchess .. .. .. „	8	0	10	0
Queen's or rags .. „	12	0	14	0
Patent .. .. .. „	13	0	15	0
Westmoreland .. „	—		—	

	s.	d.
Patent slate ridge, 7-in. sides and 3-in. roll .. .. } per ft. run	2	1
Ditto, 5½-in. sides and 2-in. roll .. „	1	3
Patent slate ridges and hips without roll, 5½-in. sides .. .. .. } „	0	7
Ditto, ditto, 7-in. sides .. .. .. „	0	8

Kellow's Patent Interlocking Slate Ridging; no screws or nails required: without crest, to cover 5 ins. on each side, per foot run, 1*s.* 1½*d.*, 6 ins. 1*s.* 3*d.*, 7 in. 1*s.* 5*d.*; with crest, to cover 5 ins. on each side, per foot run, 1*s.* 8½*d.*, 6 ins. 1*s.* 10½*d.*, 7 in. 2*s.* 1*d.*

SLATE SLABS UNDER 5 FT. × 2 FT. 6 IN.
(Exclusive of Fixing.)

	Per Foot Super.									
	¼ in.		1 in.		1¼ in.		2 in.		3 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Slate slabs, unplaned	0	8	1	2	1	7	2	1	3	0
Add for fixing	0	2	0	2½	0	3	0	3½	0	5

LABOUR ON SLATE.

	s.	d.
Planing each face .. .. per foot super.	0	2
Sanding „	0	2

	⅝ in.		1 in.		2 in.	
	s.	d.	s.	d.	s.	d.
Groove .. .. per foot run	0	2½	0	3	0	5
Rounded edge..	0	2½	0	3	0	5
Throating	0	1½	0	2	0	3
Filed edges	0	1½	0	2	0	4

SLATE SINKS.

	Per Foot Super.	
	s.	d.
1 in. thick, 4 in. deep inside, or more, bolted as cisterns	2	0
Ditto, boxed and put together with screws	2	4

SLATE CISTERNS.

	Per Foot Super.							
	⅝ in.		1 in.		1¼ in.		2 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Grooved and fitted complete, with holes bored, exclusive of fixing	1	3½	1	5	1	9	2	5
Fixing, extra	0	4	0	4	0	4½	0	5½

ENAMELLED SLATE SLABS. (Exclusive of Fixing.)

	Per Foot Super.			
	1 in. thick.		2 in. thick.	
	s.	d.	s.	d.
Egyptian and other green marbles ..	2	8	4	4
Sienna, black and gold, &c.	3	2	5	0
Pebbles and rich marbles	4	0 to 6	6	0 to 8
		0		0

Mouldings, 50 per cent. more than the above.

Lathe-turned Slate Columns.

Diameter	3 in.	4 in.	5 in.	6 in.	Not exceeding 5 feet long.
Per foot run	2/6	4/9	7/0	9/6	

Enamelled Slate Chimney-pieces.

From 17*s.* to 30*l.*, and upwards.

Enamelled Slate Urinals.

White, cream, and plain tints.

	s.	*d.*
¼-in. enamelled, one face .. .. per ft. sup.	2	4
1-in. „ „ .. .. „	2	8
1 in. „ two faces .. .. „	3	8

Slate Baths.

	£	*s.*	*d.*
Plain form with inclined back .. .. each	3	15	0
„ „ enamelled „	5	5	0

Whitland Abbey Green Slates.

Laid to 3-in. lap with copper nails.

	£	*s.*	*d.*
24 in. × 12 in. .. .. per square	3	0	0
20 in. × 10 in. .. .. „	2	10	0
18 in. × 10 in. .. .. „	2	8	0
16 in. × 10 in. .. .. „	2	7	0
14 in. × 8 in. and 12 in. × 6 in. „	2	5	0

Eureka Green Slates—per thousand of 1200 on Wharf, London.

	Size.	Price.	Weight.	Surface.
	Inches.	£ *s.* *d.*	Cwt.	Feet.
Duchess	24 × 12	18 0 0	60	1100
Small Duchess	22 × 12	16 7 6	55	950
„ „ ..	22 × 11	15 0 0	50	900
Wide Countess	20 × 12	14 7 6	50	900
Countess	20 × 10	12 2 6	40	775
Small Countess	18 × 10	10 15 0	35	675
„ „ ..	18 × 9	9 10 0	30	600
Wide Ladies ..	16 × 10	9 5 0	30	600
Ladies	16 × 8	7 10 0	25	475
Small Ladies ..	14 × 8	6 0 0	22	400

Red, White, Blue, and Strawberry Crested Ridge Tiles.

At railway station.

	s.	*d.*
Plain tile 1 ft. long	0	7
Plain fillet, ditto	0	10
Crested	1/1 to 1/5	
Plain red ridge tile	0	5

Whitland Abbey Green Slates.

Prices per M. of 1200.

Size.	Price. £ s. d.	Weight.	Surface.
24 in. × 12 in.	17 0 0	90 cwt.	1100 feet.
22 in. × 12 in.	15 0 0	80 „	950 „
20 in. × 10 in.	14 0 0	60 „	775 „
18 in. × 10 in.	10 5 0	54 „	675 „
18 in. × 9 in.	9 2 6	50 „	600 „
16 in. × 10 in.	6 18 0	50 „	600 „
16 in. × 8 in.	6 18 0	35 „	475 „
14 in. × 8 in.		30 „	400 „
14 in. × 7 in.	5 2 6	25 „	350 „
12 in. × 8 in.	5 2 6	25 „	350 „
12 in. × 7 in.		22 „	300 „
12 in. × 6 in.		18 „	250 „

Delivered in trucks at Narberth Road Station at 7*s.* per ton. Railway transit to Paddington, 13*s.* 4*d.* per ton.

Permanent Green Slates.

Delivered to any part of London, per M. of 1200.

Size.	Price. £ s. d.	Size.	Price. £ s. d.
24 in. × 12 in.	16 0 0	18 in. × 9 in.	7 0 0
22 in. „ 12 in.	14 7 6	16 in. „ 10 in.	6 5 0
20 in. „ 10 in.	10 10 0	16 in. „ 8 in.	5 0 0
18 in. „ 10 in.	8 15 0	14 in. „ 8 in.	4 0 0

Pawton Slate.

Quarry near Wadebridge, Cornwall,
Prices f. o. b. at Wadebridge.

Description.	Size.	Average Weight.	Estimated Surface.	£ s. d.
	inches.			
Duchesses ..	24 × 12	65 cwts. per 1200	10½ square per 1200	11 14 0
Marchionesses	22 × 11	54 „	8¼ „	9 12 0
Countesses ..	22 × 10	43 „	7 1/12 „	8 7 0
Viscountesses	18 × 9	32 „	5 1/11 „	5 6 0
Ladies.. ..	16 × 8	25 „	4 1/12 „	3 5 0
Small Ladies	14 × 7	19 „	3 1/13 „	1 19 0
Doubles ..	12 × 6	13 „	2¼ „	0 18 0
Best Rags ..	Various sizes.	20 dozen per ton	8 to 9 doz. per square	0 1 6
2nd ditto ..	—	25 „	12 „	0 1 0
Best Scantle	—	15 dozen per 1000	460 to 500 per square	0 12 0
2nd ditto ..	—	15 „	500 „	0 8 0

giving 3 in. lap.

Pawton Slate—*continued.*

Common Flooring, No. 1, from ¾ to 1 in. thick, containing from 4 to 10 ft. in a stone, 1½*d.* to 2½*d.* per stone.

No. 10 Flooring, covering for walls, dairy benches, &c., sawn edges and planed one side, 1 to 1¼ in. thick, from 6 to 10 ft. in a stone; floors laid of any dimensions; marked and numbered and fitted to lay without additional labour, 6*d.* per foot.

Window Sills 1 in. thick and not exceeding 1 ft. wide, planed and sawn one edge and both ends, 4½*d.* per foot; 1¼ in. thick, 5½*d.* per foot; 2 in. thick, 7*d.* per foot; and 3 in. thick, 1*s.* per foot.

No. 20 Flooring and Flag Pavements, squared but not sawn, and planed on one side, about 1 in. thick; floors laid of any dimensions; marked and numbered, 3*d.* per foot.

Silver Grey Slates.

Loaded in Trucks or Vessels at Machynlleth, North Wales.

Prices and approximate Weight per 1200 Slates.

Size.	Weight per M. of 1200.						Will cover about	Prices per M. of 1200.					
	Best.			Seconds.				Best.			Seconds.		
inches.	tons	cwt.	qr.	tons	cwt.	qr.	sq. yds.	£	s.	d.	£	s.	d.
24 × 14	3	10	0	4	0	0	127	13	0	0	10	0	0
24 × 12	3	0	0	3	10	0	108	11	5	0	8	10	0
22 × 12	2	15	0	3	5	0	98	10	2	5	7	5	0
22 × 11	2	10	0	3	0	0	87	9	5	0	6	15	0
20 × 12	2	10	0	3	0	0	87	9	2	6	6	12	6
20 × 10	2	0	0	2	10	0	72	8	0	0	5	0	0
18 × 10	1	15	0	2	5	0	63	6	0	0	6	0	0
18 × 9	1	10	0	2	0	0	60	5	2	6	4	0	0
16 × 10	1	10	0	2	0	0	56	4	17	6	3	10	0
16 × 8	1	5	0	1	10	0	44	3	7	6	2	12	6

Loading 1*s.* per ton extra.

Machine-dressed Blue Slates.

From the Oakeley Slate Quarries, Blaenau Festiniog.

Shipped at Portmadoc, North Wales.

Description.	Size.	Weight per M. of 1200.						With 3″ lap will cover about	Price per M. of 1200.					
		Best.			Seconds.				Best.			Seconds.		
	inches.	tons	cwt.	qr.	tons	cwt.	qr.	sq. yds.	£	s.	d.	£	s.	d.
Empresses ..	26 × 16	4	0	0	..			170	15	17	6	..		
Duchesses ..	24 × 12	2	15	0	3	10	0	116	11	2	6	7	10	0
Countesses ..	20 × 10	1	15	0	2	7	0	78	6	15	0	5	0	0
Viscountesses	18 × 9	1	7	0	1	17	0	62	4	17	6	3	5	0
Ladies	16 × 8	1	2	0	1	10	0	48	3	10	0	2	7	6

Machine-dressed Blue Slates.

Names.	Sizes.	First Quality. Computed Weight.	First Quality. Price per M of 1200.	Medium Quality. Computed Weight.	Medium Quality. Price per M of 1200.	Sizes.	Second Quality. Computed Weight.	Second Quality. Price per M of 1200.	Allowing 3 inch lap, will cover about
		T. C. Q.	£ s. d.	T. C. Q.	£ s. d.		T. C. Q.	£ s. d.	sq. yds.
Empresses	26 × 16	4 0 0	16 12 6	..	..	..	..	..	170
Small Empresses ..	26 × 15	3 15 0	15 17 6	..	..	..	..	..	160
Princesses	24 × 14	3 5 0	14 5 0	3 5 0	11 15 0	24 × 14	4 0 0	9 12 6	136
Duchesses	24 × 12	2 15 0	11 12 6	2 15 0	10 15 0	24 × 12	3 10 0	8 2 6	116
Small Duchesses ..	22 × 12	2 10 0	10 2 6	2 10 0	8 15 0	22 × 12	3 5 0	6 17 6	105
Marchionesses ..	22 × 11	2 5 0	9 2 6	2 5 0	8 0 0	22 × 11	3 0 0	6 10 0	97
Countesses	20 × 10	1 15 0	8 0 0	1 15 0	7 7 6	20 × 10	2 7 2	5 10 0	78
Wide Viscountesses	18 × 10	1 12 2	6 7 6	1 12 2	5 17 6	18 × 10	2 2 2	4 10 0	69
Viscountesses ..	18 × 9	1 7 2	5 17 6	1 7 2	5 7 6	18 × 9	1 17 2	3 15 0	62
Wide Ladies	16 × 10	1 7 2	5 12 6	1 7 2	5 2 6	16 × 10	1 17 2	3 15 0	60
Broad Ladies ..	16 × 9	1 5 0	4 17 6	1 5 0	4 7 6	16 × 9	1 12 2	3 5 0	52
Dames	16½ × 8½	1 5 0	4 17 6	1 5 0	4 7 6	16½ × 8½	1 12 2	3 5 0	52
Ladies	16 × 8	1 2 2	4 7 6	1 2 2	3 15 0	16 × 8	1 10 0	2 15 0	48
Wide Headers ..	14 × 12	1 10 0	5 0 0	1 10 0	4 5 0	14 × 12	1 17 2	3 15 0	60
Headers	14 × 10	1 5 0	4 10 0	1 5 0	3 15 0	14 × 10	1 15 0	3 0 0	50
Small Headers ..	13 × 10	1 2 2	4 0 0	1 2 2	3 5 0	13 × 10	1 7 2	2 12 6	46
Small Ladies ..	14 × 8	1 0 0	3 10 0	1 0 0	2 17 6	14 × 8	1 5 0	2 2 6	40
Narrow Ladies ..	14 × 7	0 17 2	3 0 0	0 17 2	2 7 6	14 × 7	1 2 2	1 17 6	36
Doubles	13 × 7	0 15 0	2 12 6	0 15 0	2 2 6	13 × 7	1 0 0	1 12 6	32
Wide Doubles ..	12 × 8	0 17 2	2 12 6	0 17 2	2 2 6	12 × 8	1 0 0	1 12 6	32
Small Doubles ..	12 × 6	0 14 0	1 10 0	0 14 0	1 5 0	..	..	..	25
Singles	10 × 8	0 15 0	1 17 6	0 15 0	1 7 6	..	..	..	26
Fractions	11 × 5½	0 12 2	1 2 6	..	..	..	..	..	20
Units	10 × 6	0 12 2	1 2 6	..	..	..	..	..	20
Odds	10 × 5	0 10 0	0 17 6	..	..	..	..	..	16

Subject to alteration without notice.

Hexagon, Gothic, Diamond, Round, or other Fancy Slates made to order at the preceding prices in First Quality only.

First Quality.—Queens, 24, 26, 28, 30, 32, and 34 ins. long and various breadths, assorted as made, without specifying quantities of each, at per ton of 20 cwt. of 112 lbs., 90*s.* and upwards.

Medium Quality.—As above, 75*s.* and upwards.

Second Quality.— „ 60*s.* „

SLATE SLABS—FIRST QUALITY.

Sawn and split to any given thickness, as follows:—

No. 1.—½ in., 90*s.*; ⅝ in., 80*s.*; 1 in., 70*s.*; 1¼ in., 60*s.*; 1½ in., 55*s.*; 1¾ in., 50*s.*; 2 in., 45*s.* per ton. From 2 ft. 9 in. to 5 ft. 6 in. long, and 1 ft. and upwards in width, planed one or both sides.

No. 2.—½ in., 105*s.*; ⅝ in., 95*s.*; 1 in., 80*s.*; 1¼ in., 70*s.*; 1½ in., 65*s.*; 1¾ in., 60*s.*: 2 in., 55*s.* per ton. From 5 to 8 ft. long and 2 ft. and upwards in width, planed one or both sides.

Slabs, various lengths and thicknesses, planed as above, 65*s.* per ton.

Skirtings of promiscuous lengths, between 2 ft. and 12 ft. long, and not less than ½ in. thick, any width from 3 to 9 ins., 85*s.* per ton.

Slabs and Skirtings of promiscuous lengths within the above dimensions and not less than ⅝ in. thick, 85*s.* per ton.

Hearth Stones planed one side or both sides, 6*d.* per foot.

Window Sills made to order.

SLABS PLANED ONE OR BOTH SIDES—MEDIUM QUALITY.

Promiscuous lengths and breadths from 2 ft. and upwards in length, and from 1 ft. and upwards in width, and from 1¼ in. and upwards in thickness, without specifying size or thickness, 40*s.* to 50*s.* per ton. Sizes to order, prices specially quoted.

FLOORING SLABS, from 3 ft. to 12 ft. in length, various widths and thicknesses, from 35*s.* per ton and upwards.

Ridge Rolls, Ridge Wings, Cisterns, Tanks, and Chimney Pieces made to order.

TILBERTHWAITE GREEN SLATE COMPANY.

Prices and particulars of the Tilberthwaite Westmorland Green Slates:—

Sorts.	Length in inches. Proportionate Widths.	Price per Ton in Truck at Coniston.	Computed to Cover Sq. Yds.
L Best slates	30 to 12	90*s.*	27 to 30
C Seconds do.	24 „ 12	60*s.*	23
T Thirds do.	24 „ 12	30*s.*	18 to 20
P Best Peggies	12 „ 9	60*s.*	27
P Seconds, do.	9 „ 6	30*s.*	23

BUTTERMERE QUEEN ANNE GREEN SLATE, made at the HONISTER and YEW CRAG SLATE QUARRIES.

TON SLATES.				SIZED SLATES.				
	Quality.	Prices per Ton, F. O. T. Keswick Station.	Computed to cover in Square Yards.	Sizes.	Prices per Mille of 1050, delivered F. O. T. Keswick Station.	Estimated Weight per 1050.	Estimated Cover of 1050 Slates, allowing 3 in. lap.
		s.		in. in.	s.	cwts.	sq. feet.
4	Best round-headed slates, mixed sizes, 18 in. to 36 in. ..	90	30 to 35	18 by 10	177	40	547
				18 „ 9	159	35	492
				16 „ 12	184	43	569
5	Do. from 12 in. to 6 in.	85	28 „ 33	16 „ 10	155	36	473
				16 „ 9	132	31	426
6	Do. from 12 in. to 18 in.	80	28 „ 32	16 „ 8	114	27	379
				14 „ 12	155	36	481
7	Second do., from 13 in. to 36 in. ..	60	25 „ 30	14 „ 10	130	30	401
				14 „ 8	100	23	321
8	Third do., from 12 in. to 36 in. ..	45	24	14 „ 7	86	20	280
				13 „ 10	118	28	364
9	Best Peggies, 9 in. to 12 in. ..	60	28 to 34	13 „ 8	97	23	291
				13 „ 7	78	19	255
				12 „ 10	108	25	327
				12 „ 8	87	20	262

TIME AND MATERIALS.

		s.	d.
Slater and Tiler	per hour	1	0
Labourer	„	0	8
Slate mason	„	0	11
Ladies slates with copper nails ..	per dozen	2	0
Countess „ „		3	0
Duchess „ „		4	2

APPROXIMATE NUMBER OF FEET IN A TON OF SLATE.

Thickness ..	¼ in.	⅜ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
Feet in a Ton.	300	200	150	120	100	75	60	50

MATERIALS, PRIME COST.

		s.	d.
Best blue and red slates, in London, 3 in. lap	per square	30	0
Best Welsh green	„	45	0
Slate cisterns	per gallon	0	5
Slate slabs, planed both sides and sawn all round:—			
1 in.	per sq. ft.	0	8
1¼ in.	„	0	10
2 in.	„	1	0

TILER.

All Materials.

PANTILING.		s.	d.
Pantiling laid dry to a 10-inch gauge	per square	24	0
Pointing outside, including fillets	add	5	6
Ditto inside only, ditto	„	7	0
Ditto both sides, ditto	„	12	0
Old pantiling stripped and relaid		15	0½
Heading	per foot run, add	0	3½
Hips and ridges	„ „	0	4
Filleting	„ „	0	1½
Ditto, in cement	„ „	0	2
Cutting to splays and hips	„ „	0	2
Painted hip-hooks	each	1	0
Ditto T nails	„	0	2

PLAIN TILING, PER SQUARE.		s.	d.
On double fir laths and wrought nails showing 4 inches on the face		44	0
Ditto on oak laths		47	0
Weather tiling and wrought nails to brickwork ..		54	0
Old plain tiling stripped, new fir laths, and retiled ..		24	0
Hips and ridge	per foot run	1	0
Plain tile valley	„	1	0
Irregular ditto	„	1	2
Grooved ridge with vertical ornament..	„	1	6
Barge or verge filled in	„	0	2½
Cuttings	„	0	2½
Flats, with three courses of plain tiles bedded solid with neat cement..	per yard sup.	6	0

MATERIALS.		s.	d.
Pantiles	per 100	9	0
Plain tiles	„	4	6
Ditto, 10½ × 6½ × ⅝	each	0	1
Pantiles, 13½ × 9½ × ½	„	0	1½
Glass tiles	„	1	4
Pantile laths	per bundle	3	6
Ditto, with nails	„	4	0
Fir laths	„	2	0
Double ditto	„	3	9
Oak ditto	„	4	6
Ditto with nails	„	5	0
Tile heads	per basket	0	10
Hip-hooks and nails	each	1	0
T nails for hips and ridges	„	0	3

BROOMHALL COMPANY'S PATENT TILES.

Battens.—Battens 3 in. × 1 in. or ⅛ in. to about a 10-in. gauge.
Full Size Tiles.—185 tiles are fixed to 100 feet super. of roof (1000 tiles weigh about 2 tons).
Small Size ditto.—Small sized tiles are made for lodges, bay windows, &c., 333 to the 100 feet super.

Cost round London.—Full sized tiles, fixed complete, including cartage and labour:—

Red Tiles	at per square (100 feet super.)	£1	13 0
Ridge	per foot lineal	0	1 6
Hip		0	1 3

Patent Damp Course.

Blocks, 14 × 9 × 1 in.; 9 × 9 × 1 in.; 4½ × 9 × 1 in.
Angles extra. Weight about 1 ton to 250 feet super.

Blocks, 18 × 9 × 1½ in.; 14 × 9 × 1½ in.; 9 × 9 × 1½ in.; 4½ × 9 × 1½ in.
Angles extra. Weight about 1 ton to 170 feet super.

Blocks, 18 × 9 × 3 in.; 14 × 9 × 3 in.; 9 × 9 × 3 in.; 4½ × 9 × 3 in.
Angles extra. Weight about 1 ton to 130 feet super.

	At London.	At Tamworth.
Price, 2½ in. thick, per foot super.	10*d.*	8*d.*
„ 1½ „ „	6*d.*	5*d.*
„ 1 „ „	6*d.*	4*d.*

Prices for the Tiles, sorted and prepared ready for fixing and shipping:—

		£	*s.*	*d.*
Red tiles	per 1000	1	15	0
Ridge tiles	per pair	0	1	5
Hip ditto	each	0	1	2
Tile pegs	per 1000	0	11	0
Galvanized tile nails	„	0	5	6
Glass tiles (packing and cases extra)	each	0	2	6

185 tiles are required for 100 feet super. of roof; one pair of ridge tiles for 15 inches lineal. One patent tile peg is required for every tile, and a galvanized 3-inch nail for each upper tile (half the number of tiles).

TILES.—P. C. Prices.

Blue Ridge Tiles.—Free in trucks or boats at the works, Potteries, Staffordshire.

	Wings in.	*s.*	*d.*
Plain, each	6 ..	0	2½
„	7 ..	0	3
Rolled top	6 ..	0	5
„	7 ..	0	5½
Rolled capped	7 ..	0	6
Capped	6 ..	0	3
„	7 ..	0	3½
„ angular	7 ..	0	6
Pyramid ridge	7 ..	1	2

Edward's Patent Tiles, Ruabon Potteries, all colours.

At Works	40*s.* per 1000.
Delivered in London	50*s.* „

Shropshire Roofing and Ridging Tiles.

Free in trucks or boats at the works, Broseley, in lots of four tons and upwards.

Per 1000.

		s.	d.
Plain roofing tiles, blue, 10½ × 6½	.. ..	35	0
„ „ brown „	.. ..	32	6
Ornamental „ blue „	.. ..	37	6
„ „ brown „	.. ..	35	0

Quarries or Flooring Tiles, per 1000.

	Blue and Red. £	s.	d.		Buff. £	s.	d.
Squares, 12 × 12 × 1¼	12	10	0	..	17	0	0
„ 9 × 9 × 1¼	5	7	6	..	7	12	6
„ 9 × 9 × 1¼	4	10	0	..	6	0	0
„ 7½ × 7½ × 1¼	3	15	0	..	4	15	0
„ 6 × 6 × 1	2	9	0	..	2	17	6
„ 4½ × 4½ × ⅞	1	15	0	..	1	17	6
Octagons, 8 × 8 × 1¼, including small squares of either colour for intersection	7	15	0	..	9	2	6
Oblongs, 9½ × 5 × 1¼	3	12	6	..	4	12	6
„ 9 × 4½ × 1	2	17	6	..	3	17	6
Hexagons 6 × 6 × 1	3	0	0	..	3	5	0

Tiles.—London Wharf Prices.

Terro-Metallic Ridge Tiles. 18 inches long.

	Wings.	Best.	Seconds.	Weight per 100 Tiles.
		Each.	Each.	
Plain ridges	6 in.	4½d.	4d.	12 cwt.
Ditto	7 „	6d.	5½d.	15 „
Capped ridges ..	6 „	6d.	5½d.	14 „
Ditto	7 „	7d.	6½d.	17 „
Ditto, angular ..	7 „	9½d.	—	18½ „
Rolled top	6 „	6½d.	6d.	16 „
Ditto	7 „	9d.	8½d.	20 „
Pyramid ridge ..	7 „	1s. 7½d.	—	22 „

Broseley Roofing Tiles.

Description.	Red, Brown, Strawberry, and Brindle. £	s.	d.	Blue. £	s.	d.	Weight per 1000.
Plain flat, 10½ in. × 6½ in. (500 cover 100 feet) per 1000	2	6	9	3	10	0	20 cwt.
Ornamental patterns, do. „	2	9	0	3	12	6	20 „
Size and a half tile to break joints at gables „	5	10	0	5	15	0	32½ „
Quoined tiles for hips (3 to a foot lineal) .. each	0	0	4½	0	0	4	4 lb. each
Do., for valleys (3 to a foot lineal) .. .. „	0	10	4	0	0	4	4 „ „
Roofing tiles pierced for nailing, 2s. 9d. per 1000 extra.							

STAFFORDSHIRE TILES—at Works.

FLOORING TILES.

Description.	Size.	Approximate Weight.	Price. Red and Blue.	Buff.
	in. in. in.	tons cwts.	s. d.	s. d.
ORDINARY HAND-MADE QUALITY.				
Quarries	4 × 4 × ¾	0 10 per 1000	32 6	37 6
„	6 × 6 × 1	1 4 „	40 0	50 0
„	7½ × 7½ × 1½	2 0 „	70 0	85 0
„	9 × 9 × 1½	3 5 „	90 0	120 0
„	9 × 9 × 1½	3 15 „	110 0	150 0
„	12 × 12 × 1½	7 0 „	250 0	350 0
PRESSED CROWN QUALITY.				
Quarries	4 × 4 × ¾	0 10 „	35 0	40 0
„	6 × 6 × 1	1 4 „	45 0	55 0
„	9 × 9 × 1½	3 5 „	100 0	130 0
PRESSED DOUBLE CROWN QUALITY.				
Quarries	4 × 4 × ¾	0 10 „	40 0	45 0
„	6 × 6 × 1	1 4 „	60 0	65 0
„	9 × 9 × 1½	3 5 „	120 0	150 0
„ Strips	6 × 4 × 1	0 16 „	50 0	—
„ „	6 × 3 × 1	0 12 „	40 0	—
„ „	6 × 2 × 1	0 8 „	32 6	—

ADAMANTINE PAVING BRICKS.

	in.	in.	in.	£	s.	d.	
Clinkers for Stables and other floors ..	6 ×	2½ ×	1½	2	7	6	per 1000
Ditto ditto ..	6 ×	2½ ×	1½ chamfered	2	10	0	„

120 pave a square yard. Weight, about 18 cwt. per 1000.

ROOFING TILES.

Description.	Approximate Weight.	Price.
HAND-MADE QUALITY.	tons. cwts.	s. d.
Plain blue roof tiles	1 4 per 1000	35 0
Plain red	1 4 „	35 0
Plain brown or (Broseley coloured) ditto	1 4 „	35 0
Ornamental roof tiles	extra ..	2 6
Pierced tiles for nailing	„ ..	2 6
Tile and half to break joint	1 15 „	70 0
Eaves tiles	0 15 „	35 0
Valley tiles, 3 to a foot	4 lbs. each	0 2½
Hip tiles „	4 „	0 3
PRESSED QUALITY.		
Plain blue roof tiles	1 2 per 1000	40 0
Plain red	1 2 „	40 0
Plain brown or (Broseley coloured) ditto	1 2 „	40 0
Ornamental roof tiles	extra ..	2 6
Pierced tiles for nailing	„ ..	2 6
Tile and half to break joint	1 15 „	80 0

Numerous Cuts, Crown 8vo, cloth, 7*s.* 6*d.*

SURVEYING AND LEVELLING.

Surveying and Levelling Instruments Theoretically and Practically Described, for Construction, Qualities, Selection, Preservation, Adjustments, and Uses, with other Apparatus and Appliances used by Civil Engineers and Surveyors.

BY

W. F. STANLEY,

AUTHOR OF 'A TREATISE ON DRAWING INSTRUMENTS.'

CONTENTS.

CHAP. I.—INTRODUCTION.
" II.—THE TELESCOPE AS PART OF A SURVEYING INSTRUMENT.
" III.—THE MAGNETIC COMPASS AS PART OF A SURVEYING INSTRUMENT OR SEPARATELY.
" IV.—LEVELS.
" V.—LEVELLING STAVES.
" VI.—DIVISION OF THE CIRCLE AND METHODS EMPLOYED IN TAKING ANGLES.
" VII.—THEODOLITES.
" VIII.—MINING SURVEY INSTRUMENTS.
" IX.—INSTRUMENTS TO MEASURE SUBTENSE OR TANGENTIAL ANGLES TO ASCERTAIN DISTANCES.
" X.—INSTRUMENTS OF REFLECTION.
" XI.—ALTITUDE MEASURING INSTRUMENTS OF A PORTABLE KIND.
" XII.—GRAPHIC SURVEYING INSTRUMENTS AND APPLIANCES CONNECTED THEREWITH.
" XIII.—INSTRUMENTS FOR MEASURING LAND AND CIVIL WORKS DIRECTLY.
" XIV.—STATIONS OF OBSERVATION.
" XV.—MEASUREMENT ON ALTITUDES BY DIFFERENCES OF ATMOSPHERIC PRESSURE.
" XVI.—MISCELLANEOUS SURVEYORS' AND ENGINEERS' INSTRUMENTS. APPLIANCES, AND ACCESSORIES.

E. & F. N. SPON, 125 Strand, London.

New York: Spon & Chamberlain, 12 Cortlandt Street.

[*To face p.* 270.

FREDK. JONES & CO.

Sole Proprietors of Wood's

PATENT BRITISH-MADE

SILICATE COTTON

OR

SLAG WOOL.

23 Prize Medals awarded during past 18 years.

FIREPROOF HEATPROOF SOUNDPROOF FROSTPROOF VERMINPROOF

For approximate prices see page 391.

ALSO

MANUFACTURERS OF

FIBROUS PLASTER SLABS,

&c.

For approximate Prices see page 278.

1A PERREN STREET, KENTISH TOWN, LONDON, N.W.

TELEGRAPHIC ADDRESS:
"SLAGWOOL, LONDON."

STAFFORDSHIRE TILES—*continued.*

ORNAMENTAL RIDGES.

Ornaments and grooved ridges, 18-inch lengths, 7-inch wings.
Blue, Red, and Brown Colours, 11*d.* to 1*s.* 2*d.* each.

RIDGE TILES.

Blue, Red, and Brown Colours.

Description.	Approximate No. of Tiles to Ton.	Price, each.
		s. *d.*
Plain ridge tiles, 6-inch wings, 18-inch lengths	180	0 3½
Plain ridge tiles, 7 inch wings, 18-inch lengths	160	0 4
Capped ridge tiles, 6-inch wings, 18-inch lengths	160	0 4
Capped ridge tiles, 7-inch wings, 18-inch lengths	140	0 4½
Rolled ridge tiles, 6-inch wings, 18-inch lengths	140	0 5½
Rolled ridge tiles, 7-inch wings, 18-inch lengths	120	0 6
Rolled and capped, 7-inch wings, 18-inch lengths	100	0 7
Grooved (for ornaments) 18-inch lengths	120	0 7
Weaving shed, 7-inch one wing, and 5-inch the other ..	160	0 5
Ventilating ridges	..	–/6 to 2/6
Ornamental fast top ridges, 18-in. lengths, top 6 in. high	90	1 6
Ornamental fast top ridges, 18-in. lengths, top 4½ in. high	140	0 10
Plain ridge to work with ornamental fast top ridges, 12-inch lengths	200	0 4½
Pyramid ridges, top 6 in. high	100	1 0
Grooved ridge, special pattern	80	2 6

PLASTERER.

RENDERING.

	Per Yard Super.	
	Straight.	Circular.
	s. *d.*	*s.* *d.*
Render, one coat	0 7	0 8
„ „ and set	0 9	0 11
„ two coats, and set	0 11	1 2
„ float, and set	1 1	1 3
„ to groins	—	2 0
LATH AND PLASTERING.		
Lathing only, single fir laths	0 7	0 9
„ and plaster, one coat	1 2	1 6
„ „ „ and set	1 5	1 9
„ „ „ and gauged	1 9	2 1
„ „ two coats, and set	1 7	1 10
„ „ two coats, and gauged	2 1	2 4
Lathing, plaster, float, and set	1 9	2 1
„ „ „ „ (ceilings)	1 11	—
„ „ „ „ to groins	—	3 6
If set with gauged putty .. .. add	0 2	—
If lath and half .. .. „	0 1	—
If double lath, add on single fir	0 2	—

Lath and Plastering.

	Per Foot Super.	
	Straight.	Circular.
	s. d.	s. d.
Quirks	0 1	0 1½
Arris	0 1½	0 2
Beads	0 3½	0 6
	per yard sup.	
Gauging, with plaster, for each coat of coarse stuff .. add	—	0 3
Stucco.		
Bastard stucco, on brick	1 4	1 7
„ „ on lath	1 11	2 3
Trowelled stucco, on brick	1 6	1 10
„ „ on lath	2 1	2 6
Trowelled stucco, on jambs and soffits .. per ft. super.	0 3½	0 4
„ „ to groins	—	0 4½
„ „ to groins, on lath	—	0 6½
	per ft. run.	
4½-in. reveals	0 4½	—
9-in. „	0 6½	—
Arris	0 1½	0 3
Quirks	0 1	0 1½
Bead	0 3	0 5
„ and double quirk	0 5	0 7
Pugging. (Timbers not to be deducted.)		
	per square.	
1½ in. thick of coarse stuff (on sound boarding)	6 0	—
1½ in. thick of coarse stuff, on single fir laths	10 0	—
Plaster Floors.		
	per yard sup.	
Floor 2½ in. thick, floated and trowelled face	3 3	—
If on lath .. add extra	1 0	—
Soffits and Friezes. (Floated and set in Putty.)		
	per ft. sup.	
Frieze or soffit, on brick	0 4½	0 5
„ „ on lath	0 5½	0 6½
	per ft. run.	
Raised margins, to form panels, 4 in. wide	0 4½	0 6
For every additional inch in width .. add	0 1	0 1½
Cornices.		
Mouldings, under 4 in. girth, per inch girth	0 1½	—
Mouldings, from 4 to 6 in. girth, per inch girth	0 1	0 1½
	per ft. sup.	
Mouldings, above 6 in.	1 0	1 3
All mitres above four to be counted as 1 ft. run of the moulding.		
Enrichments.		
	per ft. run.	
Enriched members, cast solid, per inch girth	0 2	0 3
Enriched members, undercut, per inch girth	0 3½	—
Enriched members, soffit, per inch in width	0 1½	0 2½

MARTIN'S CEMENT.

(For internal work, can be painted on in a few hours.)		Outside Work.	
	Per yd. sup. s. d.		Per yd. sup. s. d.
Render on brick	1 6	Render and rough-cast on brick	1 2
Trowelled for painting ..	2 3	„ floated	1 6
Render, float and set, on lath	3 3	Stucco on brick, and jointed, with blue lias lime ..	2 1
Floor, 1 in. thick	4 3	„ on lath and half	3 4
	per ft. run.		per ft. sup.
Narrow margins	0 4	Mouldings	1 6
Plain skirting, 9 in. high ..	0 5		per ft. run.
„ 12 in. high ..	0 6½	Arris	0 1½
	per ft. sup.	If circular, add one-fifth.	
Mouldings	1 7		
If circular, add one-fourth.			

DIRECTIONS FOR USING MARTIN'S CEMENT.

This cement is to be mixed with clean water, must be well beaten up, and applied like ordinary plaster or cement.

For Walls.—Use the coarse cement in the proportion of one measure of cement to one measure and a half of clean, dry, sharp sand, for the under-coat, of half an inch thick, and finish one-eighth of an inch thick with pure cement.

For Painting.—Once within twenty-four hours after completion, care should be taken that oil alone be employed for the first coat; adding a more than ordinary quantity of dryers for the second coat; two parts of oil to one of turps for the third coat; one part of oil to two of turps for the fourth or following coats, at the discretion of the painter; but much will depend on the description of the work; the more the suction, the more oil in proportion; body colour should be avoided in the first coat. Three coats are generally sufficient.

For Papering.—One coat of size is sufficient, and paint is not requisite.

For Floorings.—Use an equal proportion of sand and cement mixed stiff, and well beaten down with a shovel to the thickness of three-fourths of an inch on a solid foundation. Allow it to remain ten or twelve hours, and then float with half an inch of pure cement.

For Scagliola.—Work as usual.

For Castings.—Mix the materials as thick as possible to run into the moulds. Wax or sulphur moulds are best for the purpose.

For Lath Work.—Zinc nails should be used.

For Polished Work.—Proceed as for walls, but finish with fine or superfine cement if a pure white is required. It should then be worked as marble, a stopping being applied where requisite till the desired face is obtained; care should be taken that a sufficient time be allowed for the surface to dry between every application of the stone or putty powder.

To prevent stains in the work, wood or zinc trowels are recommended. When iron tools are used they should be constantly cleaned in strong lime-water; but when work is intended to be painted this precaution is unnecessary.

Plaster of Paris should not be used or mixed with this cement, nor Portland used as an under-coat.

MARTIN'S PATENT CEMENT, half-inch thick.

Of which	Will cover superficial	Or mixed with an equal quantity of sand.	Cost in London.	Cost in Derby.
			s. d.	s. d.
1 cwt. of 112 lbs.	28 feet	56 feet	5 0	4 3

Portland Cement.

	Per Yard Sup.	
	Straight.	Circular.
	s. d.	s. d.
Plain face on brick, jointed	2 4	2 10
	per ft. sup.	
„ facias, strings, or pilasters ..	0 5	0 6
„ moulding	1 4	1 8
	per ft. run.	
„ „ under 3 in. girth ..	0 4½	0 5½
4½-in. reveals or margins	0 4½	0 6
9-in. „	0 6½	0 8
	per ft. sup.	
Laid as paving, 2 in. thick	0 6	—

Roman Cement.

	Per Yard Super.	
	Straight.	Circular.
	s. d.	s. d.
Rough render, 1 of cement to 1 of sand	1 6	1 11
Plain face, on brick, jointed	1 11	2 9
„ on lath, with 1 coat of lime and hair	3 0	3 9
„ on lath and half, and coat of lime and hair	3 6	4 3
„ on double lath	3 11	4 8
If coloured to imitate stone .. .. add	0 4½	—
If Isle of Sheppy cement .. .. „	0 4	—
	per ft. sup.	
Plain facia, string, or pilaster	0 4½	0 5½
	per ft. run.	
Plain facia, string, or pilaster, under 9 in. wide	0 3	0 4
Arris	0 1½	0 1⅝
Rustics	0 3	0 4
4½-in. reveals	0 3½	0 5
9-in. reveals	0 6½	0 8⅝
Astragals, grooves, and mouldings, under 3 in. girth	0 3½	0 4½
„ „ „ 3 to 6 in. girth	0 7	0 9
	per ft. sup.	
Plain mouldings	1 2	1 4

Colouring.

	Per yard super.
	s. d.
Wash, stop, and colour (stone, buff, or salmon), once	0 4½
„ „ „ „ „ „ twice	0 5½
„ „ „ (lemon or straw), once	0 5
„ „ „ „ „ twice	0 6½
„ „ „ (grey or straw) once	0 6
„ „ „ (grey) .. .. twice	0 8½
„ „ „ (blue) .. .. once	0 8
„ „ „ „ .. .. twice	0 11½
„ „ „ (green, verditer) once	0 8½
„ „ „ „ „ twice	1 2½

Limewhite, Whitewash, and Repair.

	Per Yard Super.
	s. d.
Limewhite, once	0 2
„ twice	0 2½
Washing and stopping	0 2
„ „ for paperhanger	0 2
Wash, stop, and white to new work, once	0 2
„ „ „ „ twice	0 2½
„ „ „ old work, once	0 4
„ „ „ „ twice	0 5
Wash, stop, claircolle, and white to old work	0 4½
Cornices.	per ft. run.
Washing and stopping plain cornices, under 12 in. girth	0 1½
„ „ „ „ 12 in. to 18 in. girth	0 1½
„ „ „ „ for every enrichment not exceeding 3 in. girth add	0 1
Washing and stopping plain cornices, for every enrichment not exceeding 3 in. to 6 in. girth add	0 1½
Wash, stop, colour cornices, under 6 in. girth	0 1½
„ „ „ 6 in. to 12 in. girth	0 2
„ „ „ 12 in. to 18 in. „	0 2½
Wash, stop, colour, for every enrichment not exceeding 3 in. girth add	0 1
Wash, stop, 3 in. to 6 in. girth „	0 2½

Mastic.

	Per Yard Super.	
	Straight.	Circular.
	s. d.	s. d.
Plain face, on brick, jointed	3 3	3 9
	per ft. sup.	
„ mouldings	1 10	2 4
	per ft. run.	
Arris	0 1½	0 2½
Margins and reveals, for every inch in width	0 1½	0 1½

Day Work and Materials.

	s. d.
Plasterer per hour	0 11½
Labourer „	0 8
Boy „	0 5
Modeller „	1 3
Lime and hair per hod	0 9½
„ „ for outside work „	0 10
Fine stuff „	1 3
Putty „	1 7
Stucco „	1 6
Plaster, coarse per bag	0 9
„ fine „	0 10
„ superfine „	1 1
„ French „	0 6½

DAY WORK AND MATERIALS—*continued.*

		s.	d.
Chalk lime	per bushel	0	9
Dorking lime	"	0	10
Thames sand, washed	"	0	4½
Gypsum	"	1	10
Cement, Roman	"	1	9
" Portland	"	2	6
" metallic	"	1	6
" Atkinson's	"	4	2
" Keen's	"	4	8
" " fine	"	7	0
" Parian	"	4	9
" " fine	"	7	6
" Martin's	"	4	4
" " fine	"	5	6
" " superfine	"	8	0
Hair	"	1	5
Mastic	per cwt.	5	3
Linseed oil	per gallon	3	8
" (boiled)	"	4	10
Double size	"	1	0
Single "	"	0	9
Laths, single fir	per bundle (500 ft. run)	2	2
" " and nails	per bundle	2	8
Lath and half	"	3	2
" " and nails	"	3	9
Double lath	"	4	3
" and nails	"	5	0
Whiting	per dozen	0	4½
" best	"	0	6½
Limewhite	per pail	0	7
Whitewash, with size	"	1	0
Colour, common	"	1	6
" lemon and straw	"	2	6
" blue	"	3	0
" green (verditer)	"	4	0
Wax moulds	per lb.	3	6

PRIME COST PRICES OF MATERIALS.

		s.	d.
CEMENT.—Prices at London.			
Roman cement	per barrel of 4 bushels	10	6
Portland "	" " 4 centals	11	6
(Including barrels, 3*s.* 6*d.* each.)			
LIME.—Free on trucks at Works.			
Lump Lias	per ton	12	6
Common plaster	"	40	0
Fine "	"	47	6
PLASTER OF PARIS.			
Liverpool	per ton	33	0
Loughborough	"	27	0
Burton	"	26	0

Wire lathing for protection from fire, on iron strips $\frac{5}{8}$ in. wide. Price for wire-netting staples and iron strips 1*s.* per yard super.

Johnson's patent wire and iron fire-proof partitions from 3 to 4 in. thick, from 5*s.* per yard.

Patent Selenitic Lime.

When mixed with four or five parts of clean sharp sand, forms an excellent ground for Parian, Keen's, or Martin's cement. Six parts of sand to one of selenitic lime can be used for plastering on brick; and four parts of sand, one part of selenitic lime, and one part of well-haired lime putty, well mixed together, for lathwork.

Plasterers' work in selenitic can be completed in one-third the time required by the ordinary method, and is very superior in quality. It is also very largely used in conjunction with Portland cement for concrete building, and is equally suitable as a ground for asphalte paving.

Selenitic lime averages in price from 26*s.* at Works to 29*s.* per ton in London; in the country its price varies with the price of the local lime.

Plastering, per Yard.	Straight. £	s.	d.	Circular. £	s.	d.
Render and float on brick, and set in selenitic stucco	0	1	0	0	1	2
Lathwork. (Single fir laths.)						
Lath, render, float, and set in selenitic stucco	0	1	8	0	2	0

Per ton of 36 bushels, at wharf, 30*s.*

Concrete, if mixed with two-thirds of selenitic lime and one-third Portland, and the usual proportion of ballast, &c., will cost per rod 5*l.*

N.B. Selenitic lime is not to be used for cornices, or any work gauged with plaster.

Keen's Cement.

	s.	d.
Trowelled on brick per yard super.	2	6
„ lath „	3	10
Mouldings per ft. super.	1	10
If circular, add one-fourth.		

Jackson's Fibrous Plaster. (49 Rathbone Place, London.)

Ornamental Fibrous Plaster Ceilings of all-over design, or moulded or ribbed, from 1*s.* 3*d.* per foot super., unfixed. These ceilings only require screwing to existing timbers.

The price of Enriched Fibrous Plaster Cornices depends entirely on the number of enrichments and quantity required.

Enriched Friezes from 1*s.* per foot super., unfixed.

Enriched Mouldings 2½*d.* per inch girth.

Perforated and Undercut Mouldings extra.

Plain Face Fibrous Plaster Slabs, $\frac{1}{2}$ in. thick, made with a smooth surface and strengthened with wood, 3*d.* per foot super., unfixed. These slabs are very light, and are fixed with the smooth face downwards and the joints canvassed and made good with plaster.

Solid Fibrous Plaster Slabs, 2 ft. 6 in. × 3 ft. 6 in., $\frac{1}{2}$ in. thick, 1*s.* 4*d.* per yard super., unfixed. These slabs require a finishing coat of some plastering material.

Fibrous Plaster Caps, Columns, Pilasters, &c., depend on the design, &c.

"Jhilmil" Patent Metal Lathing consists of sheets of thin steel, having raised loops, formed on each side alternately by means of a special corrugating machine, thus forming a good key for the plaster, of which it is stated only one-half the usual quantity is required. Sheets are kept in stock of the following sizes: 5 ft. × 2 ft., 5 ft. × 1 ft. 6 in., 5 ft. × 1 ft. Price 1*s.* per yard super., without fixing.

Nelson's Portland Cement.

(16, South Wharf, Paddington, W., London.)

Specification No. 1.—Weight: The cement to weigh not less than 118 lbs. per striked bushel. Fineness: To be ground so that not more than 5 per cent. residue shall be left on a sieve having 2,500 meshes to the square inch. Tensile strain: The briquettes at 7 days (during 6 of which they shall be immersed in water) shall not break at less than 450 lbs. on the square inch.

Specification No. 2.—Weight: The cement to weigh not less than 110 lbs. per striked bushel. Fineness: To be ground so that not more than 10 per cent. residue shall be left on a sieve having 2,500 meshes to the square inch. Tensile strain: The briquettes at 7 days (during 6 of which they shall be immersed in water) shall not break at less than 350 lbs. on the square inch.

Temperature.—As the temperature has an effect on the setting of Portland Cement, it is to be understood that the briquettes be kept in a room in which the temperature is not to be allowed to fall below 60 degrees Fahrenheit.

Hitchin's Fireproof Plastering.

		s.	d.
Fibrous slabs for ordinary ceilings and walls	per yd. sup.	1	0
" " " finished in fine stuff	"	2	0
Wirework slabs about	"	1	4
Patent fire resisting ceilings fixed complete	"	2	9
Pugging slabs	per ft. sup.	0	2
Fibrous Plaster Slabs, dry	per yd. sup.	1	0
" " " damp	"	0	10½
Wire-lined " " dry	"	1	2
Patent Combined Silicate Cotton and Plaster Slabs (fireproof, soundproof, and heatproof)	per ft. sup.	0	7
Fixing Fibrous Slabs and finishing fine stuff may be reckoned to cost	per yd. sup.	1	0

Plastic Decoration Company's Enrichments.

Enriched Cornices in Fibrous Plaster, fixed complete.	Per foot run. s.	d.
Under 12 inches girth, per inch girth		
Over 12 " " " "		
Plain Moulded Cornices in Fibrous Plaster, fixed complete.		
Under 12 inches girth, per inch girth		
Over 12 " " " "		
Fibrous plaster slabs for walls and ceilings per yd. sup.		

Ceiling Flowers in Fibrous Plaster.	each.	
12 in. diameter	2	0
18 in. "	2	6
24 in. "	4	6
30 in. "	6	0
36 in. "	10	6

Ceiling Flowers in Papier Maché.		
6 in. diameter	1	0
12 in. "	3	0
18 in. "	3	4
24 in. "	5	0
30 in. "	15	0
36 in. "	23	0
42 in. "	27	6
48 in. "	40	0
60 in. "	55	0

Enriched Mouldings in Papier Maché.

Per inch girth, from

Enriched Mouldings in Fibrous Plaster.

Per inch girth, from

ELEPHONE No. 3835. TELEGRAPHIC ADDRESS: "ACTINIFORM, LONDON."

Gold Medals, Paris, 1878, 1889. | **Medal, London, 1862.**
Juror, 1851, 1862. | **Medal, Paris, 1855, 1867.**

GEORGE JACKSON & SONS,

49 Rathbone Place, London, W.

(FOUNDED 1780.)

MODELLERS, CARVERS AND MANUFACTURERS OF

ORNAMENTAL WORK

IN CARTON PIERRE, PAPIER MÂCHÉ AND WOOD.

ENRICHED CEILINGS AND CORNICES,

IN PATENT FIBROUS PLASTER.

Improved Fibrous Plaster Slabs, for Ceilings and Walls, kept in Stock ready for fixing.

[*To face page* 274.

Awarded Four Orders of Merit. One Gold Medal.

THE

PLASTIC DECORATION AND PAPIER MACHÉ CO., LTD.

Telegraphic Address "Plastic," London. Telephone No. 2677.

ESTABLISHED 1826.

Ornamental Decorators

FOR THE INTERIOR.

ENRICHED CEILINGS,

CORNICES, FRIEZES, PANELS,

PLAIN OR FLUTED COLUMNS, &c.

IN

FIBROUS PLASTER.

Joinery Work Enriched with Carton Pierre.

PLAIN NON-INFLAMMABLE SLABS

For Ceilings and Walls.

21 WELLINGTON STREET, STRAND, LONDON.

DESIGNS AND ESTIMATES FREE ON APPLICATION.

PLUMBER.

Prime Cost Prices of Materials.

	£	s.	d.		£	s.	d.
Lead.							
Pig, English .. .. .. per ton	11	15	0	to	11	10	0
„ Foreign .. .. .. „	11	6	3	„	11	7	6
Copper.							
Sheets, strong .. quoted at	45	0	0	„	54	0	0
Chili bars .. .. .. „	43	12	6			—	

	£	s.	d.
Milled lead in the sheet .. .. .. per cwt.	0	18	0
„ cut to sizes .. .. „	0	19	0
„ in gutters, flats, hips, or ridges „	1	4	6
„ in flashings .. .. „	1	5	6
Allowance made for old lead .. .. „	0	9	0
Block tin .. .. per lb.	0	1	9
Solder .. .. „	0	1	2

Drawn Lead Pipe (including Fixing).

	Per Foot Run.					
	Common.		Middling.		Strong.	
	s.	d.	s.	d.	s.	d.
½ in.	0	5	0	6	0	7
¾ „	0	8	0	9	0	10½
1 „	0	11	1	2	1	5
1¼ „	1	1	1	4	1	9
1½ „	1	5½	1	10	2	1
2 „	2	2	2	7	3	0
2½ „	2	9	3	3	3	10

Rain-water, and Socket and Funnel Pipes.

	Per Foot Run.						Per Foot Run.			
	6 lb.		7 lb.				6 lb.		7 lb.	
	s.	d.	s.	d.			s.	d.	s.	d.
2 in.	1	5	1	8	4 in.		2	8	2	11
2½ „	1	9	2	0	4½ „		2	10	3	5
3 „	2	0	2	3	5 „		3	3	3	9
3½ „	2	2	2	6	6 „		4	9	4	6

Soldered Pipes.

	Per Foot Run.		Per Foot Run.
	s. *d.*		*s.* *d.*
1 in.	1 4	1¼ in.	1 11
1½ „	1 6	2 „	2 4

Elsley's Rain water Heads and Pipes.

Flat Heads.

No.	27	32	33	36	37	38	39	40
Size of Outlet ..	3″	4″ × 3″	3″	4″ × 3″	4″ × 3″	4″ × 3″	4″ × 3″	4″
Price in Iron ..	9*s.*	23*s.*	17*s.* 6*d.*	17*s.* 6*d.*	21*s.* 6*d.*	17*s.* 6*d.*	16*s.* 6*d.*	30*s.*
Price in Lead..	17*s.* 6*d.*	42*s.*	32*s.* 6*d.*	32*s.* 6*d.*	35*s.*	32*s.* 6*d.*	30*s.*	50*s.*

No.	41	29	28	25	24	42	26
Size of Outlet	4″	4″ × 3″	4″	4 × 3″	4″	4″	4″ × 3″
Price in Iron	23*s.* 6*d.*	30*s.*	27*s.* 6*d.*	30*s.*	15*s.*	30*s.*	16*s.*
Price in Lead.. ..	50*s.*	75*s.*	50*s.*	70*s.*	30*s.*	75*s.*	35*s.*

Nos. 26, 27, and 36 can be had in Angle Heads same price as Flat.

Extra Heavy Square Pipe.

	Iron.	Lead.
With Plain Ears, 4 × 3 in.	3*s.* per yard.	12*s.* 6*d.* per yard.
Ornamental Straps	1*s.* each.	2*s.* each.

Extra Heavy Round Pipe.

	3 in.	3½ in.	4 in.
With Plain Ears	Iron 1*s.* 6*d.*	1*s.* 9*d.*	2*s.* per yard.
„	Lead 5*s.* 6*d.*	6*s.* 6*d.*	8*s.* „
Ornamental Straps			Iron 1*s.* each.
„			Lead 2*s.* each.

Ordinary Quality Square Pipes, 4 × 3 in. .. Iron, 2*s.* 4*d.* .. .. .. per yard.
„ Round „ 3 in. 1*s.* 0*d.*, 3½ in. 1*s.* 3*d.*, 4 in. 1*s.* 6*d.*, „

Pipe Nails.

Plain .. .. 6*d.* per dozen.
Ornamental .. .. 1*s.* 6*d.* „

Traps.

	2½ in.	3 in.	3½ in.	4 in.
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Lead traps, with brass bell grates .. .. each	1 9	2 0	2 6	3 0
Brass grates .. .. .. „	0 8	0 10	1 0	1 2
Brass bell trap and grate „	1 6	1 9	2 0	2 8

Driving Ferrules.—(Exclusive of fixing.)

	Each. *s.* *d.*		Each. *s.* *d.*
¼ in.	0 9	1 in.	2 4
⅜ „	1 1	1½ „	3 11

Lead.

	s.	d.
Square cistern heads .. .. each	10	6
Moulded „ .. .. „	18	0
Hoppers .. .. „	10	0
Traps .. .. „	15	0
Service box traps .. .. „	10	0
Safes for traps and closets .. .. „	8	0
4 in. cast lead D traps .. .. „	9	6
„ „ with inspection plug „	15	0
„ soil traps .. .. „	8	6
„ „ bend .. .. .. „	6	6
3 in. lead traps .. .. „	5	6
2 „ .. .. „	4	6
Smeaton's cast lead Eclipse traps .. .. from	3	9

Pumps.

	Each, prime cost.							
	2½ in.		3 in.		3½ in.		4 in.	
	£	s.	£	s. d.	£	s. d.	£	s.
Common lead pumps ..	1	6	1	13 0	2	10 0	3	3
Brass well „ ..	3	10	4	7 6	5	15 0	6	5
Hydraulic „ ..	5	12	6	16 0	8	10 0	9	5
Iron lift „ ..	1	18	2	6 0	2	14 0	3	17
Strong brass force ditto, on plank	5	5	6	6 0	7	7 0	8	8
Iron cottage pumps ..	1	0	1	7 6	1	15 6	—	

Deep well pump, with fly wheel, &c. .. .. £10 to £16.
„ Cast iron, with horse wheel, &c... £40.

Valves.

Long Spindle or Shoe Valves. Air pipe, 9d. extra.			Short Spindle Valves.		
	s.	d.			s. d.
1¼ in. .. each	5	0	¾ in. .. each		1 8
2 „ .. „	7	6	1 „ .. „		2 0
3 „ .. „	16	0	1¼ „ .. „		2 9
			1½ „ .. „		3 6
			2 „ .. „		5 6
			3 „ .. „		12 6

Sundry Articles.

(Joints extra.)	½ in.		¾ in.		1 in.		1¼ in.		2 in.		2½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Brass washers and wastes or plugs each	1	4	1	6	2	2	3	6	5	0	10	0
Boiler screws .. „	1	4	1	9	2	8	5	0	8	0	—	

	Ball. in.	Each. s.	d.
Copper water balls and rods for ½-in. cock	4½	2	3
„ „ „ „ ¾-in. „	5	2	6
„ „ „ „ 1-in. „	6	4	3
„ „ „ „ 1¼-in. „	8	9	0
„ „ „ „ 2-in. „	10	16	0

VALVES—At Warehouse.

(Joints extra.)	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
High-pressure screwdown valves, plain shanks .. .. ..each	2 1	2 10	4 6	6 10	12 9	18 6	45 0	—
High-pressure screw down valves, with one union .. .. ..each	3 2	4 1	6 5	9 4	17 9	24 6	53 0	—
High-pressure screwdown valves, with two unions .. ..each	4 3	5 4	8 4	11 10	21 9	30 6	61 0	—
Bib valve .. .. „	2 1	2 10	4 6	6 10	12 9	21 0	46 0	—
„ with boss .. .. „	2 8	3 6	5 6	8 9	16 9	24 6	52 6	—
„ for iron pipe, with union .. ..each	—	4 8	7 2	10 6	20 0	30 0	—	—
Screw bosses extra .. .. „	—	0 8	0 11	1 8	2 3	3 3	—	—
Diaphragm screw down valves each	3 8	3 9	5 3	8 6	18 6	25 0	—	—
Gun-metal bath cock, with two unions .. ..each	—	—	11 6	19 6	28 6	39 6	—	—

Shield's Patent Automatic Frictionless Opening and Closing Air-escape Taps, price at Warehouse, 7*s.* 6*d.*

Shield's Patent Automatic Frictionless Opening and Closing Air-escape Taps, continued with an adjustable spring expansion or safety-valve, price at Warehouse, 11*s.* 6*d.*

The Patent Tell-tale Expansion and Safety-valve and Anti-vacuum Valve for circulating hot-water cylinders, heating appliances, and cold-water mains, price 15*s.*

PLUMBERS' FITTINGS.

(Joints extra.)	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Washer and plug	—	1 2	1 4	1 10	2 6	3 1	4 5	—
„ with unions ..	—	2 8	3 4	4 6	6 2	—	—	—
„ „ grate and fly nut	—	—	3 4	5 0	6 6	8 6	13 6	—
Washer and waste for slate and iron cisterns	—	—	2 9	4 2	5 1	6 10	11 6	16 6
Butler's pantry, washer and plug with brass grate	—	—	—	2 0	2 3	3 0	4 6	6 6
Ferrule for main	—	0 10	1 0	1 10	2 9	—	—	—
„ with union ..	—	1 9	2 8	3 8	5 0	—	—	—
Bent ferrule, with back nut ..	—	1 3	1 9	3 10	5 10	8 10	—	—
Driving ferrule	—	0 9	1 1	2 4	3 11	4 6	—	—
Union joint for lead pipe	1 0	1 4	2 2	2 8	4 3	5 0	7 10	—
Barrel union for iron pipe	1 4	1 6	2 2	2 9	4 0	5 0	8 6	23 0
Screw-cap and screw	—	—	—	1 1	1 3	1 8	2 4	3 3
Equilibrium ball valves, turned ends	3 0	3 5	4 8	8 0	13 0	23 0	42 0	—
Equilibrium ball valves, screw ends	3 3	3 9	5 2	8 9	14 6	25 3	45 0	—
Equilibrium ball valves for high pressure, screw ends	—	5 3	7 0	11 3	18 0	25 3	50 0	—
Equilibrium ball valves for high pressure, tinned ends	—	4 11	6 6	10 6	16 6	23 0	47 0	—
Copper balls, extra	0 11	1 3	1 10	2 6	5 6	9 0	17 6	—
Zinc ditto „	0 6	0 9	1 1	1 8	2 6	4 9	8 6	—
Rods only	0 6	0 7	0 11	1 4	1 8	2 8	8 0	—

Cocks.

	½ in.	⅝ in.	1 in.	1¼ in.	1½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Bib and ball cock, screw ferrules and bottom, each	3 0	4 6	8 0	11 0	15 0
Stop cocks, square way .. .. „	2 6	3 9	7 0	10 0	13 0
„ screw ferrules .. .. „	3 0	4 9	8 3	—	—
„ round way .. .. „	3 6	5 0	10 6	—	—
„ screw bottom .. .. „	4 0	5 6	11 2	—	—
Bosses extra .. .. „	0 8	0 10	1 6	—	—

	⅜	½	⅝	¾	1
	s. d.	s. d.	s. d.	s. d.	s. d.
Bib, round shank	2 10	3 1	4 0	4 6	7 9
„ screw ferrule	3 6	3 8	4 11	5 4	9 5
„ screwed for iron	3 2	3 4	4 5	4 11	8 7
If rough barrels, less	—	0 2	0 3	0 4	0 5
With stuffing boxes extra	1 6	1 8	2 0	2 0	2 0
Stop	2 10	3 0	4 0	4 6	7 9
„ screwed one end	—	3 10	4 5	4 11	8 7
„ „ both ends	—	4 2	4 11	5 4	9 9
If rough barrels, less	—	0 2	0 3	0 4	0 5
With stuffing boxes extra	1 6	1 8	2 0	2 0	2 0

Water-closets.

	Each.
	£ s. d.
Pan closet, with valve..	1 16 0
„ „ ivory handle and white basin	2 7 6
„ „ patent valve and apparatus	£4 to £6
Hopper basin	0 9 0
Wash-hand basin, with brass washer and chain	0 6 0
„ blue, „ „	0 8 0
Water-waste preventers	£2 to £2/10
Automatic disinfectors for water-closets, exclusive of fixing	1 1 0

Valve Closets.

	£	s.	d.
Banner's "Special" Valve, patent. Ivory flush rim basin, self-cleansing overflow arm, ivory handle, brass cup, iron collar box, 1 in. supply valve copper bellows regulator	3	15	0
Banner's "Safeguard" Valve. Extra quality, with lead box, brass saddle connection, strong brass collar, other fittings as above	4	15	0

Extras.

Fitted with 1¼ in. supply valve	0	6	6
,, 1½ ,, ,, ,,	0	10	6
,, 1 ,, water waste-preventing valve, stamped New River Co., to work under the seat as shown in No. 103	0	16	6
,, 1¼ ,, water waste-preventing valve, stamped New River Co., to work under the seat as shown in No. 103	0	18	6
,, Looking-glass bottom	0	6	6
,, Silver-plated fittings	0	6	6
,, Blue basin	0	4	0
,, White and gold basin	0	12	0

	s.	d.	
"Ariston" slop receiver, white enamelled fireclay basin and trap	30	0	
Slop top for same	22	6	extra.

Slop or Wash-up Sink, with High Back and Sides.

White enamel.

	s.	d.
21 by 15 by 8½ in. outside	18	0
24 ,, 15 ,, 8½ ,, ,,	22	0
24 ,, 18 ,, 10 ,, ,,	26	0
27 ,, 18 ,, 10 ,, ,,	31	6
30 ,, 18 ,, 10 ,, ,,	35	0
36 ,, 21 ,, 11 ,, ,,	42	0
42 ,, 24 ,, 12 ,, ,,	52	0
48 ,, 24 ,, 12 ,, ,,	63	0

Baths.

No. 147. The "Trent" Bath.

	5 ft. s.	5 ft. 3 in. s.	5 ft. 6 in. s.
Stamped tinned steel, japanned sienna	85	88	92
Enamelled sienna	100	105	110
Best tinned copper, 18 W.G., enamelled	—	210	220

If fitted with 1¼ in. plug and union, 10*s.* extra.

No. 149.—Semi-Roman Bath.

Stamped tinned steel, japanned sienna	133	136	140
,, enamelled ,, ,,	148	151	154
Best tinned copper, 18 W.G., enamelled	—	280	290

If fitted with combined supply, waste and trap, 66*s.* extra.

"Du Bois" Hydraulic Drawn Lead Traps and Bends.

These Traps, being made from pure pig lead by hydraulic machinery, after the manner of lead pipe, have numerous advantages which are appreciated by every Sanitary Engineer and Plumber, being superior to either cast or hand-made Traps, as they are of uniform thickness, entirely free of sand-holes, perfectly smooth inside and out, and can be flanged or stretched without fear of splitting.

Designating Numbers.	4 inch.		3 inch.		2½ inch.		2 inch.		1½ inch.		1¼ inch.	
	8 lbs.	6 lbs.	8 lbs.	6 lbs.	8 lbs.	6 lbs.	8 lbs.	6 lbs.	7 lbs.	5½ lbs.	7 lbs.	5 lbs.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
No. 53 or S .. with Brass Screw Cap	.. ..	.. ..	8 0	6 3	6 3	5 2	4 6	4 0	3 11	3 3	3 8	2 11
No. 53 or S .. without „ „	9 6	8 0	7 3	5 6	5 6	4 5	3 10	3 4	3 4	2 8	3 2	2 4
No. 54 or ¼ S .. with Brass Screw Cap	..	..	8 0	6 3	6 3	5 2	4 6	4 0	3 11	3 3	3 8	2 11
No. 54 or ¼ S .. without „ „	9 6	8 0	7 3	5 6	5 6	4 5	3 10	3 4	3 4	2 8	3 2	2 4
No. 55 or P .. with Brass Screw Cap	..	..	6 3	5 0	5 6	4 3	3 10	3 3	3 3	2 10	3 3	2 7
No. 55 or P .. without „ „	7 9	6 3	5 6	4 3	4 9	3 6	3 2	2 7	2 9	2 3	2 9	2 0
No. 56 or Running Trap with Brass Screw Cap	..	..	6 3	5 0	5 6	4 3	3 10	3 3	3 3	2 10	3 3	2 7
No. 56 or Running Trap without „ „	7 9	6 3	5 6	4 3	4 9	3 6	3 2	2 7	2 9	2 3	2 9	2 0
No. 57 or Short Bend	5 0	4 3	3 6	2 6	2 9	2 0	2 0	1 6	1 6	1 4	1 3	1 0
No. 58 or Long Bend	6 0	5 3	4 3	3 4	3 4	2 9	2 6	2 0	1 10	1 8	1 6	1 4
No. 59 or Bag Trap .. with Brass Screw Cap	..	..	10 3	8 0	8 6	6 6	6 6	5 3	5 3	4 9	5 3	4 3
No. 59 or Bag Trap .. without „ ..	15 0	12 6	9 6	7 3	7 9	5 9	5 9	4 6	4 6	4 3	4 6	3 8

Plumbers' Fittings.

Drain Pipes.

Best salt glazed stoneware pipes, true in shape, and highly glazed—

Pipes	2	3	4	6	9	12	15	18 in. diam.	£ s. d.
Per ft.	3½d.	4½d.	6d.	8d.	1s. 2d.	1s. 10d.	3s.	4s.	
Bends	1s.	1s. 3d.	1s. 9d.	2s. 3d.	3s. 6d.	5s. 6d.	9s.	12s.	

Junctions charged as 4 ft. of pipe.
Extra branches charged as 2 ft. of pipe extra.

Intercepting Traps.

Improved cascade action intercepting trap, with open back, white glazed inside	from	0 18 9
Suburban drain intercepter	,,	0 15 0
Eureka soil and rain water intercepter	,,	0 12 6
Gullies with iron grates, &c.	,,	0 6 6
Rain water and waste pipe grid eye	,,	0 4 6
New perfect disconnecting channel	,,	0 5 0

Automatic Flushing Tanks.

Automatic flushing tanks for drains, &c., in iron, slate, earthenware, bricks, &c.	from	3 0 0

Manhole Covers.

Patent double safety manhole covers, with india-rubber joints and grease joint:

Double cover, large size, 28½ in. by 31 in. each	from	2 5 0
,, ,, small size, 20 in. by 26 in. each	,,	1 15 0
Single cover, large size	,,	1 7 6
,, ,, small size	,,	1 2 6

Ventilators.

Inlet tubes and wall bracket ventilators	from	0 15 6
Exhaust and induce cowls full bore of pipe retained for soil and ventilating pipes	,,	0 10 6
New pattern standard drain and sewer ventilators, 16 feet high	,,	8 10 0
Smeaton's umbrella water spray ventilators for large halls, theatres, &c.	,,	3 10 6
Mica flap ventilators in plain iron	,,	0 10 6

Iron Pipe.—Cast iron heavy soil or drain pipes coated Dr. Angus Smith's solution.

Per foot	2½	3	4	4½	5	6	
Price	10½d.	1s. 1d.	1s. 4d.	1s. 7d.	1s. 10d.	2s. 3d.	

Special cleaning bends and traps	from	0 5 0

Hayward's Air-tight Inspection Covers to Drains.

To suit Stone Curbs or Asphalte and Concrete Floors.

	in.	in.	in.	in.	in.	in.	in.
Size over all	15 by 15	20 by 12	21 by 21	27 by 21	27 by 27	30 by 18	39 by 27
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Plain Iron	0 17 0	1 5 0	1 10 0	1 15 0	2 0 0	1 15 0	2 10 0
Galvanized	1 2 0	1 15 0	2 0 0	2 7 0	2 14 0	2 5 0	3 0 0

Grease Joint Inspection Covers for Stone or Asphalte.

No.	Clear. ft. in. ft. in.	Plain Iron. £ s. d.	Galvanized. £ s. d.
1	2 0 by 2 0	1 5 0	2 0 0
2	2 0 ,, 1 6	1 0 0	1 15 0
3	1 6 ,, 1 6	0 18 0	1 7 0
4	1 6 ,, 1 2	0 15 0	1 2 0

Lavatory Fittings.

	£	s.	d.
Lavatory valves, viz. hot, cold, and waste, with pull-up knobs, plates, and chains, and brass connection for basin .. .. per set	2	10	6
Ditto, ditto, cold and waste, with ditto .. .. „	2	1	0
Electro-plated fittings .. .. extra	0	8	0
Earthenware plates, gilt letters, per valve .. .. „	0	2	0
Larger hot and cold valves, for very small pressure .. .. „	0	5	0
Lavatory basin, white, gold lines, overflow, 16 in. outside diameter	0	18	6
Ditto, 18 in. ditto	1	9	0
Ditto, flown blue pattern, 16 in. outside diameter	0	14	0
Ditto, 17 in. ditto	1	0	0
Ditto, plain white, 16 in. outside diameter	0	10	0
Ditto, 18 in. ditto	0	16	0
Lavatory valves, consisting of cold and waste valve, with pull-up knobs, plates and chains, and brass connection for basin per set	1	15	6
Larger cold valve, for very small pressure .. .. extra	0	2	6
Electro-plated fittings .. .. „	0	6	6
Earthenware plates with gilt letters .. .. „	0	4	0
Marbled earthenware angular table top, length of side, 20½ in. ..	1	15	6
No woodwork or pipe included in above prices.			

Urinals.

Self-acting galvanized treadle urinal platform with valve complete	2	2	0
Improved flat back earthenware flushing urinal .. small size	0	14	6
Ditto .. .. large „	1	1	0
Enamelled angle urinal, with grated iron pipe for waste, requiring no brass work .. .. each	0	7	3
Earthenware improved flushing, with inlet arm and waste pipe ..	0 15 0 to 1 1 0		

High-pressure Diaphragm Bib Valves:—

With screw ferrule for lead pipe. Screw cut to fit iron pipe	½ in.	0	3	0
Ditto	ditto	¾ in.	0	3	6
Ditto	ditto	¾ in.	0	4	6
Ditto	ditto	¾ in.	0	5	0
Ditto	ditto	1 in.	0	8	2
Ditto	ditto	1¼ in.	0	14	0
Ditto	ditto	1½ in.	1	2	0
With shanks tinned for lead pipe		½ in.	0	2	6
Ditto	ditto	¾ in.	0	3	0
Ditto	ditto	¾ in.	0	3	10
Ditto	ditto	¾ in.	0	4	5
Ditto	ditto	1 in.	0	6	8
Ditto	ditto	1¼ in.	0	10	6
Ditto	ditto	1½ in.	0	17	0

Bath Fittings.

Fullway Diaphragm Bath Valves, with 1-in. unions, for lead pipe, brass levers and plates, hot, cold, and waste	3	12	0
Tylor's Patent Lock-waste Bath Apparatus, with two 1-in. loose valve screw-down supply taps, with gilt-lettered porcelain knobs, "Cold" and "Hot," brass spout and mountings, with quick-waste bath valve with unions for 1¼-in. lead pipe on inlet and outlet, with gilt-lettered porcelain knob, brass pull-up, and 19 inches of lead pipe attached, and piece of strong copper wire	5	0	0
Electro-plated mountings .. .. extra	1	0	0

Baths.

	£	s.	d.
Taper Oval-end Bath, with one reversible copper pipe for waste and overflow or warning pipe, with flange connections—			
5 ft. 3 in. copper	10	0	0
5 ft. 6 in. „	10	10	0
5 ft. 3 in. galvanized tinned iron	4	15	0
5 ft. 6 in. „ „	5	0	0
5 ft. 3 in. zinc	3	3	0
5 ft. 6 in. „	3	10	0
The above baths finished sea green instead of white marble extra	0	12	0
Wood cradle fitted to bath on all sides, preventing damage in carriage, and forming its permanent support	0	16	9
Full-way diaphragm bath valves, with wrought-iron rods, letters, and plates, hot, cold, and waste	3	12	0
Shower bath, rounded copper, white marbled outside, complete	3	17	6
¾ in. patent bell valve and ball	0	4	8
Galvanized tinned iron shower bath	2	17	6
Cliff's Roman bath, glazed inside only	7	10	0
„ „ in and out	14	0	0

Porcelain Enamelled Cast-Iron Lavatory.

Measurements—26½ × 19½ in. Bowl (oval) 19½ × 12½ in. inside.

Enamelled White on top, and Black and White on front edge, 24*s.* each.

With overflow, 1*s.* extra.

Safety Valves for Kitchen and Heating Boilers.

Size Valve.	Screwed for Iron Pipe.	Pressure per Square In. and Head of Water in Ft.								
		Pressure.	Up to 15 lbs.		20 lbs.		25 lb.		30 lbs.	
		Hd. in ft.	34¼ ft.		46 ft.		57½ ft.		69 ft.	
			£	s. d.	£	s. d.	£	s. d.	£	s. d.
½ in.	½ in.	Price	0	12 6	0	13 0	0	13 6	0	14 0
¾ „	¾ „	„	0	18 0	0	19 0	1	0 0	1	1 0
1 „	1 „	„	1	3 0	1	4 0	1	5 0	1	6 0

SMITH AND FOUNDER.

N.B.—All Iron prices at present subject to considerable fluctuation.

ROLLED IRON GIRDERS. (P. C. Exclusive of Fixing.)

	Per ton, prime cost. £ s. d.
20 in. × 8 in. × 8 in., about 100 lbs. per ft. ..	10 0 0
18 „ × 7 „ × 7 „ „ 80 „ ..	
16 „ × 6 „ × 6 „ „ 62 „ ..	
14 „ × 6 „ × 6 „ „ 60 „ ..	
12 „ × 6 „ × 6 „ „ 56 „ ..	
10 „ × 6 „ × 6 „ „ 56 „ ..	
8 „ × 6 „ × 6 „ „ 34 „ ..	
3 „ × 3 „ × 3 „ „ 10 „ ..	8 0 0
12 „ × 5 „ × 5 „ „ 42 „ ..	
6 „ × 5 „ × 5 „ „ 27 „ ..	
10 „ × 5 „ × 5 „ „ 36 „ ..	
10 „ × 4½ „ × 4½ „ „ 32 „ ..	
9½ „ × 4½ „ × 4½ „ „ 29 „ ..	to
9½ „ × 3½ „ × 3½ „ „ 24 „ ..	
8 „ × 5 „ × 5 „ „ 29 „ ..	
8 „ × 4 „ × 4 „ „ 22 „ ..	
4 „ × 3 „ × 3 „ „ 12 „ ..	
8½ „ × 3 „ × 3 „ „ 17 „ ..	
8 „ × 2½ „ × 2½ „ „ 15 „ ..	6 0 0
7 „ × 4 „ × 4 „ „ 18 „ ..	
6 „ × 3 „ × 3 „ „ 16 „ ..	
5 „ × 3 „ × 3 „ „ 13 „ ..	
3 „ × 2 „ × 2 „ „ 5½ „ ..	
7 „ × 2½ „ × 2½ „ „ 14 „ ..	
6 „ × 2 „ × 2 „ „ 12 „ ..	
4 „ × 2 „ × 2 „ „ 7 „ ..	
5 „ × 2 „ × 2 „ „ 10 „ ..	
Lengths to 20 ft. without extra; 7s. 6d. per ton extra for each 5 ft. over 20 feet.	
Flitch plates to 5 cwt. each, without extras; 5s. per ton extra for each ¼ cwt. over 5 cwt.; drilling bolt holes, 6d. each.	10 0 0
Bolts, nuts, and washers for ditto:—	per cwt.
⅜ in. diam. × 6 in. and longer	1 5 0
½ „ „	1 6 6
¾ „ „	1 7 6
	per ton.
Bond hoop iron, and 1 in. × 18 W.G... ..	7 0 0
Ditto galvanized	14 0 0
Heavy iron rails	4 0 0
Plates, 6 in. × ¼ in.	10 0 0
„ 7 „ × ¼ „	
„ 8 „ × ¼ „	

Bolt-ends with square nuts ¾ in. diameter, 19s. 6d., ⅞ in. and larger, 17s. 6d. per cwt. Hexagon nuts, 2s. 6d. per cwt. extra.

Riveted box girders, from £11.

STEEL. (Prices delivered in London.)

	£ s.
Steel roller joists .. .. from	7 0 per ton.
„ plate riveted girders .. .. „	to
„ box „ .. .. „	15 0 „

For Safe Loads, see p. 57.

CAST IRON. (Exclusive of Patterns and Fixing.)

	Per Cwt.					
	s.	d.		s.	d.
Girders, standards, and plain castings..	8	0	to	10	0
Hollow columns	8	0	„	10	0
Area gratings, plain	11	0	„	15	0
Small doors and frames	15	0	„	20	0
Sashes and frames	16	0	„	20	0

	Each.	
	s.	d.
4-in. bell trap	1	0
6-in. „	1	9
9-in. „	3	6
Air bricks, 9 in. × 4½ in.	0	7
„ 14 „ × 4½ „	1	4

CAST-IRON PIPES AND GUTTERS. (Exclusive of Fixing.)

	Per Yard Run.									
	2½ in.		3 in.		3½ in.		4½ in.		5 in.	6 in.
	s.	d.	s.	d.	s.	d.	s.	d.	s. d.	s. d.
Pipes (round)	1	1	1	5	1	8	2	4	2 10	4 0
Gutter H.R.	0	8	0	10	1	0	1	3	1 5	1 9
Add for fixing	—		—		0	9	0	11	1 1	1 2
	each.									
Elbows, Plinth Bends ..	1	2	1	5	1	8	2	4	2 9	3 6
Shoes	1	0	1	2	1	4	1	10	2 6	3 0
Heads	1	10	2	0	2	4	3	0	3 6	4 3
O G Gutters	—		—		1	0	1	4	1 6	1 10

Brackets, 6*d.* each. Nails for pipes, 8*d.* per dozen.
Bolts and Nuts, 5*s.* 4*d.* per gross.

SQUARE RAIN-WATER PIPES. (Exclusive of Fixing.)

	Per Yard Run.							
	2½ in. × 2 in.		3 in. × 2 in.		4 in. × 2½ in.		5 in. × 3 in.	
	s.	d.	s.	d.	s.	d.	s.	d.
Pipes ..	2	8	3	0	3	6	4	9
Elbows ..	2	9	3	6	4	0	5	6
Shoes ..	1	9	2	0	2	10	4	0

Wrought Iron. (Exclusive of Fixing.)

	s.	d.
Straps and ties in floors and roofs .. per lb.	0	4
Chimney and bearing bars .. .. .. „	0	3½
Screw bolts with nuts and washers .. „	0	6½
Plain balusters .. .. „	0	5
Casements and saddle bars . .. .. „	0	7
Open iron cisterns, small sizes .. .. per gall.	0	9
„ „ galvanized .. .. „	0	11
„ „ large sizes .. .. „	0	4
„ „ „ galvanized „	0	5
Copper-hole door and frame, 12 in. diam. ..each	3	0 to 6 0
„ „ 18 in. „ „	12	0
Iron pavement lights, with rough plate per foot glass .. .. super.	4	6
Best scrap iron .. .. per cwt.	7	0

Galvanized Iron.

	Per Ton, P.C. at Liverpool. £	s.	d.
No. 12 gauge, weighing 4½ lbs. per sq. ft.	11	0	0
„ 16 „ „ 3½ „ „ to			
„ 20 „ „ 2½ „ „	12	0	0
If corrugated, add	1	10	0
If curved „	0	10	0

Cisterns and Miscellaneous, P. C. (Exclusive of Fixing.)

	Open top. £	s.	d.	Closed. s.	d.
Wrought-iron cistern, 600 gallons, each	7	10	0	—	
Ditto, 400 gallons .. .. .. „	4	10	0	—	
Ditto, 5 by 2·3 by 3, 200 gallons „	3	12	6	—	
Ditto, 4 by 2 by 2, 100 gallons „	2	5	0	—	
Ditto, galvanized, 150 gallons, per gall.	0	0	5	0	9
Ditto, 75 gallons .. .. .. „	0	0	7	0	11
Ditto, 50 „ .. .. .. „	0	0	8	1	0
Ditto, 30 „ .. .. .. „	0	0	10		
Ditto, with divisions .. .. .. „	6d. and upwards				

Wrought-Iron guaranteed Water-tight Casements and Frames.

Hinged at side to open outwards, prepared to receive plate glass in one pane each, and with square heads.

Those of Quality No. 1 are fitted with gun-metal lever handles and stays, finished and lacquered or bronzed, and those 4 ft. 6 in. and upwards in height are furnished with treble slide fastenings working on gun-metal plates.

Those of Quality No. 2 are fitted in every way similar to the above, except that those 4 ft. 6 in. and upwards in height are furnished with treble slide fastenings of their usual pattern.

Those of Quality No. 3 are fitted with gun-metal lever handles and stays, finished and lacquered or bronzed, and those 4 ft. 6 in. and upwards in height are furnished with double slide fastenings of their usual pattern.

Those of Quality No. 4 are fitted with plainly filed gun-metal lever handles and stays, and those 4 ft. 6 in. and upwards in height are furnished with double slide fastenings of their usual pattern.

Those of Quality No. 5 are fitted with malleable iron lever handles and wrought-iron push-out stays.

	Quality No. 1.	Quality No. 2.	Quality No. 3.	Quality No. 4.	Quality No. 5.
	each.	each.	each.	each.	each.
	s. d.	s. d.	s. d.	s. d.	s. d.
Under 2 ft. in height	41 0	39 6	37 6	36 0	33 0
2 ft. and under 2 ft. 6 in. in height	42 0	40 6	38 0	37 0	34 0
2 ft. 6 in. and under 3 ft. „	43 0	41 6	39 0	38 0	35 0
3 ft. „ 3 ft. 6 in. „	43 6	42 0	40 0	39 0	35 6
3 ft. 6 in. „ 4 ft. „	47 0	45 6	43 0	42 0	38 6
4 ft. „ 4 ft. 6 in. „	47 6	46 0	44 0	43 0	39 6
4 ft. 6 in. „ 5 ft. „	72 6	63 0	58 6	56 0	47 6
5 ft. „ 5 ft. 6 in. „	74 0	65 0	60 6	58 0	49 0
5 ft. 6 in. „ 6 ft. „	78 0	68 6	64 0	61 6	53 0

Wrought-iron "fixed lights" of a section so that the glass in them is in the same plane as that in the opening casements, and the margin of iron shown is also the same, prepared to receive plate glass in one pane each, and with square heads.

	each.
	s. d.
Under 2 ft. in height	14 0
2 ft. and under 2 ft. 6 in. in height	14 6
2 ft. 6 in. „ 3 ft. „	15 0
3 ft. „ 3 ft. 6 in. „	16 0
3 ft. 6 in. „ 4 ft. „	18 0
4 ft. „ 4 ft. 6 in. „	18 6
4 ft. 6 in. „ 5 ft. „	20 0
5 ft. „ 5 ft. 6 in. „	21 0
5 ft. 6 in. „ 6 ft. „	23 0

Section No. 11.

Hinged at side to open outwards, prepared to receive plate glass in one pane each, and with square heads.

Those of Quality No. 1 are fitted with gun-metal lever handles and stays, finished and lacquered, or bronzed.

Those of Quality No. 2 are fitted with gun-metal lever handles and stays, plainly filed.

Those of, Quality No. 3 are fitted with malleable iron lever handles and wrought-iron push-out stays.

	Quality No. 1.	Quality No. 2.	Quality No. 3.
	each. s. d.	each. s. d.	each. s. d.
Under 2 ft. in height	30 0	29 0	26 0
2 ft. and under 2 ft. 6 in. in height ..	31 0	29 6	27 0
2 ft. 6 in. „ 3 ft. „ ..	32 0	30 6	27 6
3 ft. „ 3 ft. 6 in. „ ..	32 6	31 6	28 6
3 ft. 6 in. „ 4 ft. „ ..	35 0	33 6	31 0
4 ft. „ 4 ft. 6 in. „ ..	35 6	34 6	31 6
4 ft. 6 in. „ 5 ft. „ ..	39 0	37 6	34 6
5 ft. „ 5 ft. 6 in. „ ..	40 0	38 6	35 6

Wrought-iron "fixed lights," of a section so that the glass in them is in the same plane as that in the opening casements, and the margin of front shown is also the same, prepared to receive plate glass in one pane each and with square heads.

	each.
Under 2 ft. in height	12 6
2 ft. and under 2 ft. 6 in. in height	13 0
2 ft. 6 in. „ 3 ft. „	13 6
3 ft. „ 3 ft. 6 in. „	14 0
3 ft. 6 in. „ 4 ft. „	15 6
4 ft. „ 4 ft. 6 in. „	16 0
4 ft. 6 in. „ 5 ft. „	17 6
5 ft. „ 5 ft. 6 in. „	18 0

Sections 3 and 4.

Those of Quality No. 1 are fitted with gun-metal lever handles and stays, finished and lacquered, or bronzed, and those 4 ft. 6 in. and upwards in height are furnished with treble slide fastenings, working on gun-metal plates.

Those of Quality No. 2 are fitted in every way similar to the above, except that those 4 ft. 6 in. and upwards in height are furnished with treble slide fastenings of their usual pattern.

Those of Quality No. 3 are fitted with gun-metal lever handles and stays, finished and lacquered, or bronzed, and those 4 ft. 6 in. and upwards in height are furnished with double slide fastenings of their usual pattern.

Those of Quality No. 4 are fitted with plainly filed gun-metal lever handles and stays, and those 4 ft. 6 in. and upwards in height are furnished with double slide fastenings of their usual pattern.

Those of Quality No. 5 are fitted with malleable iron lever handles, and wrought-iron push-out stays.

	Quality No. 1.	Quality No. 2.	Quality No. 3.	Quality No. 4.	Quality No. 5.
	each. s. d.	each. s. d.	each. s. d.	each. s. d.	each. s. d.
Under 2 ft. in height	36 6	35 0	33 0	32 0	28 6
2 ft. and under 2 ft. 6 in. in height ..	37 6	36 0	34 0	32 6	29 6
2 ft. 6 in. „ 3 ft. „ ..	38 6	37 0	35 0	33 6	30 6
3 ft. „ 3 ft. 6 in. „ ..	39 6	38 0	35 6	34 6	31 0
3 ft. 6 in. „ 4 ft. „ ..	42 6	41 0	38 6	37 6	34 0
4 ft. „ 4 ft. 6 in. „ ..	43 0	41 6	39 6	38 0	35 0
4 ft. 6 in. „ 5 ft. „ ..	67 0	58 0	53 0	50 6	42 0
5 ft. „ 5 ft. 6 in. „ ..	69 0	60 0	55 0	52 6	44 0
5 ft. 6 in. „ 6 ft. „ ..	73 0	63 6	58 6	56 6	48 0

Wrought-iron "fixed lights" of a section so that the glass in them is in the same plane as that in the opening casements, and the margin of iron shown is also the same, prepared to receive plate glass in one pane each, and with square heads.

	each. s. d.
Under 2 ft. in height	14 0
2 ft. and under 2 ft. 6 in. in height	14 6
2 ft. 6 in. „ 3 ft. „	15 0
3 ft. „ 3 ft. 6 in. „	16 0
3 ft. 6 in. „ 4 ft. „	18 0
4 ft. „ 4 ft. 6 in. „	18 6
4 ft. 6 in. „ 5 ft. „	20 0
5 ft. „ 5 ft. 6 in. „	21 0
5 ft. 6 in. „ 6 ft. „	23 0

In cases where it is not important that the plane of the glass in the "fixed lights" shall be the same as that in the opening casements, they can be supplied at much less prices than the above.

Semicircular or Gothic heads for casements, 9*s.* 6*d.* each extra. Trefoil heads for casements, 13*s.* 6*d.* each extra. Semicircular or Gothic heads for fixed lights, 5*s.* 6*d.* each extra. Trefoil heads for fixed lights, 9*s.* each extra. Cross-bars, 1*s.* 3*d.* each bar extra.

PATENT "ECLIPSE" STEEL CASEMENTS AND FRAMES.

	Quality No. 1.	Quality No. 2.	Fixed Lights.
	s. d.	s. d.	s. d.
2 ft. and under 2½ ft. high..	29 6	25 0	20 6
3 ft. „ 3½ „	32 6	28 0	22 6
4 ft. „ 4½ „	35 6	31 0	25 6
4½ ft. „ 5 „	38 0	33 6	28 6

WELDED WROUGHT-IRON TUBES FOR GAS, STEAM, AND WATER. (Exclusive of Fixing.)

Nominal Internal Diameter, inches..	⅛	¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	2½	2¾	3	3½	4
" " " millimetres	3·17	6·35	9·52	12·70	19·05	25·40	31·75	38·10	44·45	50·80	57·15	63·50	69·85	76·20	88·90	101·63
External Diameter, inches..	⅜	½	¾	⅞	1 1/16	1 5/16	1 11/16	1 15/16	2 3/16	2⅜	2⅝ 2⅞	3	3⅜	3½	4	4⅝ 4½
" " approx. millimetres	9·52	12·70	15·87	20·63	26·99	33·33	42·87	47·62	52·39	60·32	66·68 69·85	76·20	82·55	88·90	101·60	111·12 114·30
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1 Tubes, 2 to 14 ft. long, per ft. ..	0 2	0 2½	0 3	0 4½	0 6	0 8½	1 0	1 3	1 6	1 9	2 7	3 3	4 0	4 6	5 6	7 0
2 Pieces, 12 to 23½ in long	0 4	0 5	0 7	0 9	1 0	1 4	1 8	2 0	2 6	3 0	4 6	6 3	7 6	9 0	11 6	14 6
3 " 3 to 11½ in.	0 2	0 3	0 4	0 6	0 8	0 11	1 1	1 4	2 0	2 3	4 0	4 9	6 0	7 0	8 0	9 0
4 Long Screws, 12 to 23½ in.	0 5	0 7	0 9	0 11	1 2	1 6	2 0	2 6	3 3	4 0	5 6	7 0	8 6	10 0	12 6	15 6
5 " " 3 to 11½ in.	0 4	0 5	0 6	0 8	0 10	1 0	1 3	2 0	2 6	3 0	4 6	5 6	6 6	7 6	8 6	10 0
6 Bends	0 5½	0 6½	0 7	0 8	0 11	1 3	1 9	2 3	3 3	4 3	6 6	10 0	12 0	16 0	25 0	32 6
7 8 9 Springs not Socketed	0 4	0 5	0 6	0 7	0 9	0 11	1 4	1 8	2 6	3 3	5 6	7 6	10 0	12 0	19 0	26 0
10 Socket Union. 11 Pipe Union ..	—	2 0	2 6	3 0	4 0	5 6	6 9	8 0	9 0	10 0	12 0	14 0	16 0	18 0	22 0	28 0
12 Elbows	0 6	0 6½	0 7	0 8	0 10	1 2	1 9	2 3	3 0	3 6	5 6	8 6	11 0	14 0	22 0	28 0
13 Tees	0 6	0 6½	0 7	0 9	1 0	1 3	1 9	2 6	3 0	3 9	6 0	9 6	12 6	16 6	24 0	30 0
14 Crosses	1 2	1 4	1 4	1 11	2 4	3 0	4 0	4 8	6 0	7 0	14 0	21 4	28 0	40 0	56 0	66 8
15 Plain Sockets	0 1½	0 1½	0 2	0 3	0 3½	0 4	0 6	0 7	0 9	1 0	1 6	2 6	3 0	3 6	5 0	6 0
16 Diminished Sockets	—	0 3	0 4	0 5	0 6	0 7	0 9	0 11	1 1	1 3	2 0	3 0	4 0	5 0	7 0	9 0
17 Flanges	0 8	0 9	0 10	1 0	1 2	1 4	1 6	1 9	2 0	2 6	3 9	5 0	6 9	8 6	10 0	11 6
18 Caps. 19 Plugs	0 2	0 3	0 3	0 4	0 5	0 6	0 8	0 10	1 0	1 3	2 0	2 6	3 6	4 9	7 0	10 0
20 Backnuts. 21 Nipples	0 1	0 2	0 2	0 3	0 3½	0 4	0 6	0 8	0 10	1 0	1 9	2 3	3 0	3 6	4 6	5 6
22 Union Bends	—	2 6	3 0	3 9	5 0	6 3	8 6	10 0	11 6	13 6	16 0	19 0	22 0	25 0	30 0	36 0
23 Round Elbows..	0 7	0 7	0 8	0 9	1 0	1 4	1 11	2 6	3 4	3 10	6 6	10 0	13 0	16 0	25 0	32 0
24 Iron Main Cocks	2 3	2 3	2 9	3 6	4 6	6 6	8 6	11 0	14 0	18 0	27 0	36 0	44 0	50 0	75 0	90 0
25 " " " with Brass Plugs	—	—	4 6	5 6	7 6	10 6	15 0	19 6	25 0	32 0	47 0	60 0	90 0	110 0	140 0	190 0
26 Round Way Iron Cocks	—	—	3 6	4 0	5 6	7 6	10 0	13 0	17 0	22 0	38 0	54 0	62 0	70 0	100 0	160 0
27 " " " with Brass Plugs	—	—	5 0	6 6	9 0	13 0	19 0	28 0	36 0	42 0	60 0	85 0	105 0	120 0	180 0	280 0
28 Cock Span's Wrought Iron	—	—	1 0	1 4	1 8	2 0	2 4	3 0	3 6	4 0	4 9	6 0	7 6	9 0	12 0	14 0
29 " " " Mall. Cast Iron	—	—	0 7	0 8	0 10	1 2	1 8	2 2	2 9	3 3	4 9	6 0	7 6	9 0	12 0	14 0
30 Syphon Boxes, 1 quart	—	—	—	11 0	12 0	13 0	14 0	15 0	15 6	16 0	18 0	—	—	—	—	—
31 " " 2 "	—	—	—	—	16 0	17 0	18 0	19 0	21 0	23 0	25 0	30 0	35 0	40 0	—	—
32 " " 3 "	—	—	—	—	20 0	22 0	24 0	25 0	26 0	28 0	32 0	35 0	40 0	45 0	50 0	56 0
33 " " 4 "	—	—	—	—	21 0	23 0	25 0	27 0	29 0	31 0	34 0	38 0	42 0	47 0	54 0	60 0
34 Mall. Round Elbows	0 6	0 6½	0 7	0 8	0 10	1 2	1 9	2 3	3 0	3 6	5 6	9 0	12 0	15 0	30 0	40 0

N.B.—Steam Tubes are 1 gauge heavier than Water Tubes, and Water Tubes 1 gauge heavier than Gas Tubes.

WROUGHT-IRON "FIXED LIGHTS" to correspond in appearance with the above Casements, with or without one cross-bar to each, and with square heads :—

	Quality No. 1.		Quality No. 2.	
	s.	d.	s.	d.
Under 2 ft. in height .. .. each	27	6	17	6
2 ft. 6 in. and under 3 ft. in height .. „	28	6	18	6
3 ft. „ 3 ft. 6 in. „ .. „	32	0	22	0
3 ft. 6 in. „ 4 ft. „ .. „	33	6	23	6
4 ft. „ 4 ft. 6 in. „ .. „	35	6	24	6
4 ft. 6 in. „ 5 ft. „ .. „	37	6	26	6
5 ft. „ 5 ft. 6 in. „ .. „	38	6	27	6
5 ft. 6 in. „ 6 ft. „ .. „	41	0	30	0

Windows and frames, hung at bottom to open inwards, and fitted with malleable iron side guides, with or without one cross-bar to each, and with square heads, any size up to, say, 3 ft. 6 in. in height, 25*s.* each and 28*s.* each.

WINDOWS AND FRAMES

Hung on centres any size up to, say, 3 ft. 6 in. in height, 20*s.* and 22*s.* 6*d.* each.
Ditto ditto, superior make, 26*s.* 6*d.* and 30*s.* each.

WROUGHT-IRON HOPPERS FOR CHURCHES AND SCHOOLS,

To fall inwards, and with sides for glazing, and with two pulleys, any size up to 3 ft. 6 in. in height, 27*s.* 6*d.* each.
Wrought hoppers, as above, with top to lift up, and fitted with hinges, any size up to 3 ft. 6 in. in height, 25*s.* 6*d.* each.
N.B.—With all the above, the prices are determined solely by the heights, irrespective of the widths, which may vary from, say, 6 in. to 2 ft.

GALVANIZED WROUGHT-IRON PIPE AND FITTINGS.

At the Warehouse.

	Per Foot Run.											
	2 in.		1¼ in.		1½ in.		1 in.		¾ in.		½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Tube in lengths from 2 ft. to 14 ft.	2	3	1	6½	1	2½	0	11	0	8	0	6	0	4
Short pieces under 2 ft. ..	3	9	2	6	2	2	1	8½	1	3½	1	0	0	6½

(Exclusive of Fixing.)

	Per Foot Run.									
	3 in.		2½ in.		2 in.		1½ in.		1¼ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Strong tinned and brazed copper pipe	5	6	3	10	2	11	2	0	1	10

CAST-IRON FLANGE PIPE.

	1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Per yard at Warehouse	2 6	3 5	4 4	4 8	7 3	9 9	12 0
	Over 6 in. 15s. per cwt.						
Bends, T's, Branches, &c., per cwt.	22 0	19 0	19 0	18 6	18 0	17 6	17 6

CAST-IRON SOCKET PIPE.

Per yard at Warehouse	1 8	2 3	3 0	3 5	5 3	7 0	9 0
	Over 6 in. 12s. per cwt.						
Sockets, T's, Bends, &c., per cwt. ..	20 0	17 6	17 6	17 0	17 0	16 6	16 6

LONGDEN & CO.'s SUNBEAM RADIATORS.

Description.	Height.	Width, 1 ft. 1 in. No. of Loops, 4	Width, 1 ft. 7 in. No. of Loops, 6	Width, 2 ft. 2 in. No. of Loops, 8	Width, 2 ft. 8 in. No. of Loops, 10	Width, 3 ft. 2 in. No. of Loops, 12	Width, 4 feet. No. of Loops, 15	Width, 5 ft. 4 in. No. of Loops, 20
	ft. in.	sup. feet.	sup. feet.	sup. feet.	sup. feet.	sup. feet.	sup. feet.	sup feet.
AA	3 4	12¼	19	25	31¼	37½	47	63
A	3 0	11	17	22½	28	33½	42	56
B	2 6	9½	14	18½	23	27½	34½	46
C	2 0	7½	11	14½	18	21½	27	36
D	1 6	5½	8	10½	13	15½	19½	26
E	1 0	3	4½	6½	8	9½	12	16

Retail Prices of Steam Radiators.

		4 Loops.	6 Loops.	8 Loops.	10 Loops.	12 Loops.	15 Loops.	20 Loops.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
AA	—	2 1 6	2 16 6	3 12 6	4 10 0	5 8 0	6 15 0	9 0 0
A	—	1 19 0	2 13 0	3 7 6	4 4 0	5 1 0	6 6 0	8 8 0
B	—	1 15 0	2 7 6	3 0 0	3 15 0	4 10 0	5 12 6	7 10 0
C	—	1 12 0	2 3 0	2 14 0	3 7 6	4 1 0	5 1 6	6 15 0
D	—	1 9 0	1 18 6	2 8 0	3 0 0	3 12 0	4 10 0	6 0 0
E	—	1 5 0	1 12 6	2 0 6	2 10 6	3 0 6	3 15 6	5 1 0

RADIATORS.

Hayward Brothers and Eckstein's "Safford" Radiators are made with right and left screwed nipple connections, no bolts or packing used, consequently nothing to get out of repair. Kept in stock, 26 in., 28 in., and 32 in. high, in four different patterns. Price 1*s.* 8*d.* to 2*s.* per square foot.

HAYWARD'S PATENT SELF-LOCKING COAL PLATES WITH PROTECTING RINGS.

	12 in.	14 in.	16 in.	18 in.
	s. d.	s. d.	s. d.	s. d.
D. S.L. Solid Iron	6 0	7 0	11 6	14 6
C. S.L. Ventilating	6 0	7 0	11 6	14 6
B. S.L. Illuminating	8 6	10 6	12 0	17 6

HAYWARD'S PATENT SELF-FASTENING COAL PLATES WITH PROTECTING RINGS.

	12 in.	14 in.	16 in.	18 in.
	s. d.	s. d.	s. d.	s. d.
No. 1. S.F. Solid Iron	4 6	5 6	7 0	8 6
No. 2. S.F. Ventilating	4 6	5 6	7 0	8 6
No. 3. S.F. Illuminating	7 6	9 6	13 0	16 0
No. 4. S.F. „ and Ventilating	7 6	9 6	13 0	16 0

CAST-IRON SASHES.		s.	d.
8 in. × 12 in.	each	4	10
2 in. × 18 in.	„	6	9
18 in. × 30 in.	„	9	6
33 in. × 48 in.	„	22	0

ST. PANCRAS IRONWORK COMPANY'S STABLE AND HARNESS-ROOM FITTINGS.

	From £ s. d.	To £ s. d.
Stall, manger, and hay rack, plain	2 2 6	4 10 0
Ditto, enamelled	3 0 0	5 10 0
Stall, manger, hay rack, and water trough, plain	2 7 6	4 12 6
Ditto, enamelled	3 10 0	5 15 0
Loose box, manger, and hay rack, plain	1 17 0	4 5 0
Ditto, enamelled	2 17 6	5 5 0
Loose box, manger, hay rack, and water trough, plain	2 15 0	4 12 6
Ditto, enamelled	3 17 6	5 15 0
Stall division, consisting of post, ramp, and cill	2 0 0	4 5 0
Ditto, all wrought iron	2 7 6	4 15 0
Stall division, consisting of post, ventilating ramp, and cill	3 10 0	10 10 0
Loose box posts, cast-iron	1 17 6	3 10 0
Ditto, wrought-iron	2 5 0	4 15 0
Inverted ventilating ramps for loose boxes	2 12 6	4 15 0
Ventilating grating for loose boxes per ft.	0 6 6	0 18 0
Iron framed loose box doors	5 15 0	8 0 0
Wrought-iron surface gutter, per ft.	0 2 6	—
Trapped drain pots each	0 6 0	1 10 0
Patent brackets for driving harness:— Single, japanned, 10*s.*; enamelled, 16*s.* 6*d.* per set. Double, japanned, 18*s.*; enamelled, 31*s.* per set.		
Patent brackets for riding harness:— Japanned, 12*s.* 6*d.*; enamelled, 18*s.* 6*d.* per set. Japanned, 15*s.*; enamelled, 21*s.* 6*d.* per set.		
Coach-house door hinges, per pair	0 13 0	1 17 6
Patent stable paving bricks, 60 to the square yard:— Welsh quality, 4*l.* 16*s.* per 1000. Staffordshire quality, 4*l.* 16*s.* per 1000.		

For continuation, *see* "Sundries," page 326.

ST. PANCRAS IRONWORK COMPANY'S COW-HOUSE AND PIGGERY FITTINGS.

	From £ s. d.	To £ s. d.
Improved iron fittings for cow-stalls .. .. per cow	2 10 0	5 0 0
Piggery fronts, consisting of trough, door, and standards	4 15 0	5 5 0
Sashes, cast-iron .. .. per ft. sup.	0 1 0	—
Ditto, wrought-iron, with improved mitre joints .. .. per ft. sup.	0 1 6	—
Casements from 6s. each extra.		
Wrought-iron doors and frames, panelled on one side, per ft. sup.	0 5 0	—
Spiral or geometrical staircases, per foot high: 3 ft. 6 in. diam., 14s. 6d., to 6 ft. diam., 1l. 8s. 6d.		

ST. PANCRAS IRONWORK COMPANY'S CIRCULAR IRON STAIRCASES, Complete.

	£ s. d.
3 ft. 6 in. diameter .. .. .. per foot high	0 14 0
6 ft. „ .. .. .. „	1 6 0

STRAIGHT IRON STEPS (including String and Rail on each side).

	£ s. d.
2 ft. wide .. .. per step	0 18 6
3 ft. „ .. .. „	1 1 6

GALVANIZED IRON FURNACE PANS.

6 to 20 gallons	6½d. per gallon.
60 to 100 „	8d. „

Set of furnace ironwork for coppers, including door and frame, hinges, latch, holdfasts, grate and bearing bars—

6½ × 5½, 6s.; 8½ × 6½, 12s.; 10 × 7, 16s. each.

HAYWARD BROTHERS AND ECKSTEIN'S IMPROVED CIRCULAR IRON STAIRCASES.

Tread, Riser and Spandril in One,

Which gives much greater strength and stiffness than when the treads are built up of three pieces.

Including top landing and three ornamental bars on landing, one bar on each step, with half-round hand-rail, fitted and marked ready for fixing—

	s. d.
Diameter, 3 ft. 6 in. .. .. per foot rise	16 0
„ 4 ft. 0 in. .. .. „	18 0
„ 4 ft. 3 in. .. .. „	19 0
„ 4 ft. 6 in. .. .. „	20 0
„ 5 ft. 0 in. .. .. „	22 0
„ 5 ft. 6 in. .. .. „	34 0
„ 6 ft. 0 in. .. .. „	38 6

x 2

GAS FITTINGS.

Dimensions of Thomas Glover & Co.'s Patent Dry Gas Meters.

Size of Meter.	Outside Dimensions.			Diameter of Inlet and Outlet Inside.	Distance between centres of Inlet and Outlet.
	Height.	Breadth.	Depth, Back to Front.		
	in.	in.	in.	in.	in.
1 light.	11⅞	8½	6½	¾	7 5/16
2 „	13¾	10	7½	⅞	8¾
3 „	15½	11½	8½	1	10½
5 „	16⅝	12⅞	8½	1⅛	11⅜
10 „	19½	14⅞	10⅝	1	13
20 „	23½	18½	12⅝	1¼	16⅝
30 „	26½	20⅝	15½	1⅜	18⅜
40 „	29	22⅝	15½	1⅜	20½
50 „	32	25½	18	1½	22⅝
60 „	34	27½	20½	1¾	24½
80 „	39⅛	31	23	2½	27½
100 „	41⅝	32½	25½	2½	28⅝
150 „	51½	42	29	3	34
200 „	56⅝	42½	30	3½	38½ Height to centre of connections.
250 „	58½	42½	30	3½	38½
300 „	62½	46½	33½	4	43
400 „	70½	50½	40	4½	48
500 „	77½	56½	45	5½	52

Dimensions of larger sizes on application.

Capacity of meters 6 cubic feet per light per hour.

Trade Prices of Thomas Glover & Co.'s Dry Gas Meters.

	£	s.	d.	Stamping. £	s.	d.		£	s.	d.	Stamping. £	s.	d.
1 light ..	1	0	6	0	0	6	100 light ..	13	15	0	0	2	0
2 „ ..	1	4	6	0	0	6	120 „ ..	15	0	0	0	3	0
3 „ ..	1	10	0	0	0	6	150 „ ..	18	17	0	0	5	0
5 „ ..	1	16	6	0	0	6	200 „ ..	25	4	0	0	6	0
10 „ ..	2	7	0	0	1	0	250 „ ..	28	15	0	0	7	0
15 „ ..	2	16	0	0	1	0	300 „ ..	34	5	0	0	8	0
20 „ ..	3	5	0	0	1	0	400 „ ..	44	0	0	0	14	0
30 „ .	4	10	0	0	1	0	500 „ ..	55	0	0	1	0	0
40 „ ..	5	10	0	0	1	0	600 „ ..	66	0	0	1	2	0
50 „ ..	6	5	0	0	1	0	700 „ ..	77	0	0	1	3	0
60 „ ..	8	8	0	0	1	0	800 „ ..	88	0	0	1	5	0
80 „ ..	10	12	0	0	2	0	1000 „ ..	110	0	0	1	13	0

All gas meters carefully and skilfully repaired at moderate charges.

ORIGINAL MAKERS. ESTABLISHED 1844.

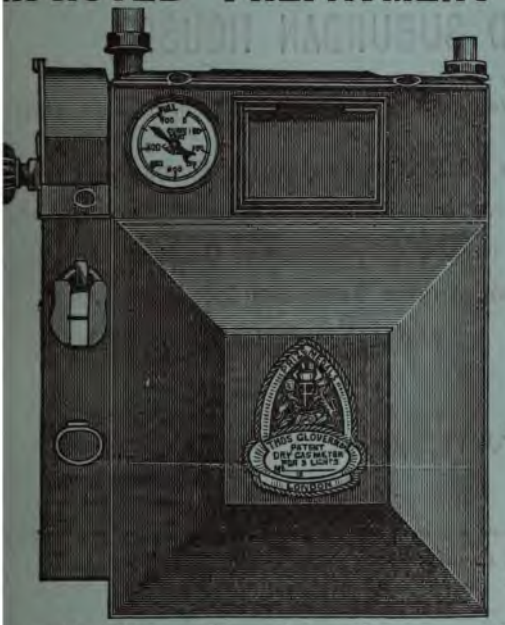
HOMAS GLOVER & CO.

Six Medals awarded to Thomas Glover's Patent Dry Gas Meters.

The Highest Award for Dry Gas Meters at the Paris Exhibition, 1867.

Since then we have not Exhibited for Prizes.

PATENT NEW
MPROVED PREPAYMENT METER.



For Pennies, Shillings, or any Coin.

SIMPLE IN MECHANISM.

POSITIVE IN RESULTS.

PRICE CHANGER IN SITU.

GUARANTEED FOR FIVE YEARS.

egraphic Address: "GOTHIC, LONDON." Telephone No. 6725.

THOMAS GLOVER & CO.,

DRY GAS METER MANUFACTURERS,

–222 ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 2 Victoria Street. l. Add.: "GOTHIC."

BIRMINGHAM: 3 Bridge Row, Deritend. Tel. Add.: "GOTHIC."

MANCHESTER: 37 Blackfriars Street. Tel. Add.: "GOTHIC."

[*To face* p. 298.

GAS FITTINGS.

Dimensions of Thomas Glover & Co.'s Patent Dry Gas Meters.

Size of Meter.	Outside Dimensions.			Diameter of Inlet and Outlet Inside.	Distance between centres of Inlet and Outlet.
	Height.	Breadth.	Depth, Back to Front.		
	in.	in.	in.	in.	in.
1 light.	11⅞	8¼	6¼	¾	7 3/16
2 ,,	13½	10	7¼	⅞	8⅝
3 ,,	15¼	11¼	8¼	1	10¼
5 ,,	16⅝	12⅞	8¾	1⅛	11⅝
10 ,,	19¼	14⅞	10¼	1	13
20 ,,	23¼	18¼	12⅝	1¼	16⅝
30 ,,	26¼	20¼	15½	1⅝	18⅝
40 ,,	29	22¼	15½	1⅝	20¼
50 ,,	32	25¼	18	1¼	22⅝
60 ,,	34	27¼	20¼	1¾	24¼
80 ,,	39¼	31	23	2¼	27½
100 ,,	41⅝	32½	25½	2½	28¾
150 ,,	51¼	42	29	3	34
200 ,,	56¾	42¼	30	3½	38½
250 ,,	58¼	42¼	30	3½	38½
300 ,,	62¼	46¼	33½	4	43
400 ,,	70¼	50¼	40	4½	48
500 ,,	77¼	56¼	45	5¼	52

Height to centre of connections.

Dimensions of larger sizes on application.

Capacity of meters 6 cubic feet per light per hour.

Trade Prices of Thomas Glover & Co.'s Dry Gas Meters.

	£	s.	d.	Stamping. £	s.	d.		£	s.	d.	Stamping. £	s.	d.
1 light ..	1	0	6	0	0	6	100 light ..	13	15	0	0	2	0
2 ,, ..	1	4	6	0	0	6	120 ,, ..	15	0	0	0	3	0
3 ,, ..	1	10	0	0	0	6	150 ,, ..	18	17	0	0	5	0
5 ,, ..	1	16	6	0	0	6	200 ,, ..	25	4	0	0	6	0
10 ,, ..	2	7	0	0	1	0	250 ,, ..	28	15	0	0	7	0
15 ,, ..	2	16	0	0	1	0	300 ,, ..	34	5	0	0	8	0
20 ,, ..	3	5	0	0	1	0	400 ,, ..	44	0	0	0	14	0
30 ,, ..	4	10	0	0	1	0	500 ,, ..	55	0	0	1	0	0
40 ,, ..	5	10	0	0	1	0	600 ,, ..	66	0	0	1	2	0
50 ,, ..	6	5	0	0	1	0	700 ,, ..	77	0	0	1	3	0
60 ,, ..	8	8	0	0	1	0	800 ,, ..	88	0	0	1	5	0
80 ,, ..	10	12	0	0	2	0	1000 ,, ..	110	0	0	1	13	0

All gas meters carefully and skilfully repaired at moderate charges.

ORIGINAL MAKERS. ESTABLISHED 1844.

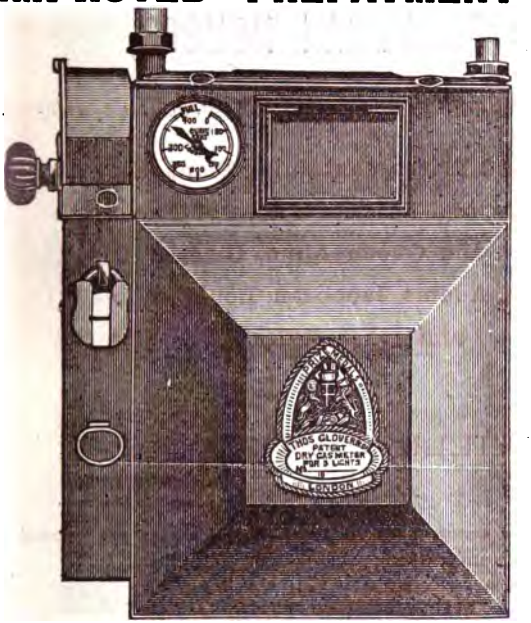
THOMAS GLOVER & CO.

Six Medals awarded to Thomas Glover's Patent Dry Gas Meters.

The Highest Award for Dry Gas Meters at the Paris Exhibition, 1867.

Since then we have not Exhibited for Prizes.

PATENT NEW
IMPROVED PREPAYMENT METER.



For Pennies, Shillings, or any Coin.

SIMPLE IN MECHANISM.

POSITIVE IN RESULTS.

PRICE CHANGER IN SITU.

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6725.

THOMAS GLOVER & CO.,
DRY GAS METER MANUFACTURERS,
214–222 ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 62 Victoria Street. Tel. Add.: "GOTHIC."

BIRMINGHAM: 3 Bridge Row, Deritend. Tel. Add.: "GOTHIC."

MANCHESTER: 37 Blackfriars Street. Tel. Add.: "GOTHIC."

[*To face p.* 298.

COPPER.

					£ s. d.
No. 20 W. G.	1 lb.	10 oz.	per foot	per cwt.	5 10 0
22	1	4	"		
24	1	0	"		
26	0	12	"		
28	0	8	"	"	6 0 0
30	0	6	"	"	7 10 0

Open washing coppers, up to 100 galls., per cwt. above price of strong copper, 30s.

	⅝ in.	1 in.	2 in.
Wrought copper nails ..	1s. 9½d.	1s. 7d.	1s. 6d. per lb.
	⅜ in.	½ in.	
" tacks	3s.	1s. 10d.	"

Copper, prime cost, sheet .. .. £15 to £54 per ton.

	Per Foot Run.	
	weight—lbs.	s. d.
Copper pipes, 2 inches diameter ..	1½	3 0
" 2½ " ..	1¾	4 0
" 3 " ..	2½	4 6
" 4 " ..	3	5 8
Joints	—	6s. to 7s.

	Per Foot Run.				
	¼ in.	½ in.	¾ in.	1 in.	2 in.
	s. d.	s. d.	s. d.	s. d.	s. d.
Brass Tubing	0 2	0 4	0 6	0 9	1 6

BELLHANGER.

	s. d.
House bell, hung complete, with copper wire, each	11 6
" with concealed wires and tubes "	17 0
	per ft. run.
Copper tubing	0 8
Zinc "	0 4
	per lb.
" wire	1 6
Bellhanger .. .. per hour	0 11
14 oz. bell, with steel spring and ⊤ plate back } spring carriage .. .. each }	6 0
Electric bells, fixed complete, including apparatus, from 16s. to 35s. per push.	

PAINTER.

Common Colours.

	Per Yard Super.
	s. d.
Painting once in oil, including knotting and stopping	0 4
Ditto twice ditto, ditto	0 7
Ditto three times ditto, ditto	0 9½
Ditto four times ditto, ditto	1 0
Ditto each additional coat .. .. add	0 2½
Flatting .. .. „	0 3
If sanded .. .. „	0 4
If in party colours .. .. „	0 2
Grounds for imitations .. .. „	0 0½
If grey, drab, or salmon colours .. .. .. „	0 1½
„ Brunswick green .. .. „	0 1½
„ lilac, olive, or light green .. .. „	0 2
„ Indian red .. .. „	0 4
„ patent green, blue verditer, or yellow .. „	0 6
„ vermilion or lake .. .. „	1 9
„ imitation granite .. .. „	0 6

Ladder work about double the above prices.

Skirtings in Common Colours.

	Per Foot Run.	
	Plain not more than 8 in. wide.	Moulded not more than 12 in. wide.
	s. d.	s. d.
In oil, once	0 1	0 1½
„ twice	0 1½	0 2
„ three times	0 2	0 2½
„ four „	0 2½	0 3
Flatted .. .. add	0 0½	0 0½

Reveals.

	Per Foot Run.	
	4½ in. wide.	9 in. wide.
	s. d.	s. d.
In oil, once	0 1	0 1½
„ twice	0 2	0 2½
„ three times	0 2½	0 3½
„ four „	0 3	0 4

Common Colours.

	Per Foot Run.							
	1 coat.		2 coats.		3 coats.		4 coats.	
	s.	d.	s.	d.	s.	d.	s.	d.
Rain-water pipes and gutters	0	2	0	3	0	4	0	5
Plain cornices, not exceeding 10 in. girth	0	1½	0	2½	0	3	0	3½
Ditto flatted	0	2	0	3	0	3½	0	4
	per yard super.							
Enriched cornices, friezes, &c.	1	6	2	3	3	0	3	9
Ditto flatted .. .. add 9d.								
	per foot run.							
Mouldings and small articles If varnished, for each coat, add 1d.	0	1	0	1½	0	2	0	2½

Imitations.

	Per Yard Super.	
	s.	d.
Oak, combed and shadowed	1	6
Mahogany and maple	1	11
Satin wood	2	3
Rosewood	2	8
Yew, walnut, or amboyna wood	3	0

Imitation Marbles.

	Per Yard Super.	
	s.	d.
Veined marble, including white ground ..	2	3
Black and gold, dove, or Bardilla	4	0
Devonshire or Sienna	5	6
Oriental or verd antique	6	6

Sash squares per dozen .. .. = 1 yard of work.
" frames .. .. = ⅔ "

Common Colours.

	Each.	
	s.	d.
Ordinary sash frames, once in oil	0	11
" twice "	1	3
" three times "	1	5
" four times "	1	9

For Venetian or large frames add ⅓rd.

Varnishing.

	Per Yd. Sup.
	s. d.
Once, with best copal	0 7
Twice „	0 11
Three times „	1 3
If on the natural wood, add	0 4
Cleaning and sizing old work	0 8
Spirit varnish, each coat	0 5
	per ft. sup.
Hand polishing	0 6
„ to columns	1 0
„ to moulded work	1 6
French polishing	0 8
	per ft. run.
„ to handrails and small articles	5d. to 8d.

Sash squares per dozen .. .. = 1 yard of work.
„ frames .. .. = $\frac{3}{4}$ „

	Per Dozen.
	s. d.
Sash squares, once in oil	1 0
„ twice „	1 3
„ three times „	1 6
„ four times „	1 9
Cleaning wainscot or mahogany square, and varnishing	2 9
Sash squares grained, wainscot or mahogany	1 4
Rosewood	1 9

Writing.

	Per inch in Height.	
	Plain.	Egyptian.
	s. d.	s. d.
Plain letters	0 0$\frac{1}{2}$	0 0$\frac{1}{2}$
Sunk „	0 0$\frac{1}{2}$	0 1
Gold „	0 1$\frac{1}{2}$	0 2
„ large letters	0 2$\frac{1}{2}$	0 3

Gilding.

	Per ft. sup.
	s. d.
Gilding in oil, gold plain work	4 0
„ „ burnished „	5 0
	per ft. run.
„ „ $\frac{1}{2}$-in. moulding	0 2$\frac{1}{2}$
„ „ $\frac{3}{4}$-in. „	0 3$\frac{1}{2}$
„ „ 1-in. „	0 4$\frac{1}{2}$
Bronze mouldings, 2 in. girth	0 2

MANUFACTURERS' PRICES.

		s.	d.
Purple brown	per cwt.	14	0
Brown oxide of iron	"	14	0
Anti-corrosive crimson	"	14	0
Braganza green	"	24	0
Navy green	"	25	0
Victoria green	"	24	0
Bronze green	"	27	0
Celestial blue	"	24	0
Blue zinc	"	24	0
Italian yellow	"	33	0
Satin yellow	"	22	0
Lemon chrome	"	30	0
Orange chrome	"	30	0
Stone colour	"	24	0
New metallic chrome	"	21	0
Flesh (or meat colour)	"	25	0
Orange lead	"	34	0
Ivory black	"	18	0
White lead—1st	"	30	0
" 2nd	"	27	0
" 3rd	"	23	6
" jointing	"	16	0
White zinc paint—1st	"	28	6
" 2nd	"	24	0
Putty	"	7	6
Ozonized paint dryer	"	18	0
Macbean's Magnetic composition	"	24	0
Vulcan cement (for steam joints)	"	17	0
Soap powder	"	18	0
Imperial black varnish	per gall.	1	5
French polish	"	9	0
Oak varnish	"	6	0
Copal	"	8	0
Gold size	"	6	6

ANTI-CORROSION PAINT FOR OUTDOOR WORK AND DAMP WALLS.

Directions for Use.

Mixing, for Outdoor Work.—The Anti-Corrosion Paint is a powder, and all the preparation needed before using it is to mix the dry colour with the necessary quantities of oil, &c., as follows:

White, Stone Colours, Lead Colours, Purple Brown, Blue, Bright, Medium, Deep, or Invisible Green, require to each cwt. of dry colour, 6 gals. raw linseed oil, 1 gal. boiled ditto, 1 gal. turpentine—total, 8 gals.; or 7 lbs. of powder to ¼ gal. of mixture.

Buff, Chocolate, Black, Oak Colour, Bronze Green, or Dark Red, require to each cwt. of dry colour, 7½ gals. raw linseed oil, 1½ gal. boiled ditto, 1½ gal. turpentine—total, 10 gals.; or 5¼ lbs. of powder to ¼ gal. of mixture.

Bright Red requires to each cwt. of dry colour, 5 gals. raw linseed oil, 3 gals. boiled ditto—total, 8 gals.; or 7 lbs. of powder to ¼ gal. of mixture.

NOTE.—When any of the above colours are required for interior work, a mixture of 5 gals. raw linseed oil and 3 gals. turps, instead of the above, which is *only* intended for external purposes, is recommended.

It is important to keep the Paint well stirred during use, to prevent settlement; but should any sediment take place it *must not* be thinned with oil and used in the ordinary manner, but had better be mixed with another potful of paint. In preparing the Anti-Corrosion for use, the oil mixture should be *first* poured into the paint pot, the necessary powder then added, and the whole stirred together until incorporated. The paint should be mixed at least twenty-four hours before it is used, as it will then go further and dry quicker.

Preparation of Work.—All rust, distemper, decayed and loose paint should be removed before painting. Work wetted by rain must be allowed to dry before the paint is applied, or it is apt to blister. Paint should *never* be used on work to which black varnish or tar has been applied.

Priming.—When painting new work, cement, stucco, or where there is much absorption, it is advisable either to use the first coat very thin, or apply a coating of priming colour mixed with boiled oil, in the proportion of 12 gallons of oil to 1 cwt. of priming.

Application.—The work being properly cleaned and *dry*, each coat of paint should be laid on equally and evenly, and well spread with the brush, small brushfuls being taken at a time. No succeeding coat must be applied till the previous one is sufficiently hard; neither should a light colour be used over a dark one.

Number of Coats required.—For new ironwork and work of every description which has been before painted, two coats are sufficient; new woodwork requires three coats; and porous substances, such as brick, stucco, soft stone, &c., four coats.

Surface Covered.—One cwt. of the paint in powder mixed with its proper proportion of oil mixture covers, once over, on—

Porous stone or brick ..	about 250 square yards.
Compo, cement, and stone	300 to 400 „
Woodwork	400 to 500 „
Ironwork	600 to 700 „

	Per cwt.		Per cwt.
Light Stone	32*s.*	Portland Stone	32*s.*
„ Portland Stone..	32*s.*	Cream Colour	32*s.*
Buff	32*s.*	Bath Stone	32*s.*
Blue	42*s.*	Bright Red	28*s.*
Oak Colour	26*s.*	Deep Green	42*s.*
Medium Green	42*s.*	Dark Red	26*s.*
Purple Brown	26*s.*	Bright Green	42*s.*
Bronze Green	26*s.*	Lead Colour	26*s.*
Light Lead	28*s.*	Chocolate	20*s.*

Tints for Interior Use.—For painting the interior of rooms, &c., the Anti-Corrosion, or outdoor paint, is not suitable, nor is its use desirable or advantageous. The slight roughness of surface, not observable in the open air, would be objectionable, and the absence of exposure to the weather would fail to bring its lasting qualities into operation. 1 cwt. of powder requires 8 gallons of oil mixture, or 7 lbs. to ¼ gallon.

Mixture.—Mix the powder and oil in the above proportions, but not at first using the whole of the mixture. Allow the paint to stand for twenty-four hours, and then add the remaining oil, and stir thoroughly—it is then fit for use.

Cleaning.—Before painting it is necessary to see that the work is quite clean

and free from grease; all parts that have been handled must be washed with soda and water, or with a weak solution of detergent.

	Per cwt.		Per cwt.
White	38s.	Blue Tint	38s.
Stone Colour	36s.	French Grey	38s.
Buff Tint	36s.	Grey Tint	38s.
Salmon Tint	38s.	Light Sage	38s.
Light Drab	36s.	Green Tint	38s.
Drab	36s.	Olive Green	38s.
Fawn	38s.		

Day Work.

	s.	d.
Painter per hour	0	10½
Gilder „	1	0
Country work. Extra for lodgings and expenses		
Common colour per lb.	0	6
Putty „	0	3
Cement „	0	6
Oil gold size „	3	2
Gold leaf per book	2	3
Laminated lead for damp walls per cwt.	21	6

Lincrusta Walton, the Sunbury Wall Decoration.

Dados, from 16 in. to 28 in. wide.	Prices from	1 6	per lineal yard.
Fillings „ 18 „ „ 24 „ „	„	1 3	„
Friezes „ 5½ „ „ 18½ „ „	„	0 9	„
Borders „ ½ „ „ 4 „ „	„	0 0½	„
Panels, Plaques — All sizes and great and beautiful variety.	Prices from 1d. each to 10s. according to size and weight.		

New illustrated design book, 500 designs, price 5s. nett.

Paperhangers' Prices.

	s.	d.
Pumicing, sizing, and preparing walls per piece	0	6
Lining paper „	1	0
Ditto, hanging „	0	9
Canvas lining „	3	0
Ditto, hanging complete „	1	9
Hanging common papers „	9d. to 1s.	
Ditto satin and embossed ditto „	1s. to 2/6	
If in blocks, add „	0	4
Sizing and varnishing, once „	3	6
„ twice „	6	6
Common papers in two colours „	1s. to 3s.	

CHICAGO EXHIBITION, HIGHEST AWARDS.
GOLD MEDAL, PARIS, 1889.
AND SEVENTEEN OTHER GOLD, SILVER, & BRONZE MEDALS.

WM. WOOLLAMS & CO.,

ORIGINAL MAKERS OF

ARTISTIC WALL PAPERS,

GUARANTEED FREE FROM ARSENIC.

☞ **SPECIALITIES.** All kinds of Block Printed Papers. Ceiling Patterns in great variety. A fine collection of old Damask and Chintz Papers. Raised Flocks for painting over. Dado Decorations. "Anaglypta." "Japanese Leathers." "Lincrusta."

PAPER-HANGINGS FREE FROM ARSENIC.

WM. WOOLLAMS & CO.

		s.	d.		s.	d.
Machines, Pulps	Per piece	0	6	to	1	3
,, Grounds	,,	1	0	,,	3	0
,, Sanitaries	,,	0	9	,,	3	0
,, Satins	,,	1	6	,,	3	0
,, Golds	,,	2	6	,,	6	0
Block, Damasks, Grounds	,,	2	6	,,	10	0
,, ,, Satin	,,	4	6	,,	18	0
,, ,, Mica	,,	6	0	,,	18	0
,, Chintzes	,,	6	0	,,	18	0
Raised Flocks (for painting over)	,,	11	6	,,	20	0
Embossed Leather Papers	,,	14	0	,,	42	0
Patent Embossed Flocks	,,	42	0	,,	84	0
Lacquered Leather Papers	,,	90	0	,,	126	0

SOLE ADDRESS:

110 HIGH ST., NEAR MANCHESTER SQUARE, LONDON, W.

Printers of and Trade Agents for Mr. J. Aldam Heaton's Private Designs for Wall and Ceiling Papers.

SPECIAL FACILITIES for PRINTING PRIVATE PATTERNS.
CORRESPONDENCE INVITED.

[*To face page* 306.

JUST PUBLISHED.

In Demy 8vo, cloth, 600 pages, and 1420 Illustrations, 6s.

SPONS'

MECHANICS' OWN BOOK.

A MANUAL FOR HANDICRAFTSMEN AND AMATEURS.

CONTENTS.

Mechanical Drawing—Casting and Founding in Iron, Brass, Bronze, and other Alloys—Forging and Finishing Iron—Sheet-metal Working—Soldering, Brazing, and Burning—Carpentry and Joinery, embracing descriptions of some 400 Woods, over 200 Illustrations of Tools and their uses, Explanations (with Diagrams) of 116 joints and hinges, and Details of Construction of Workshop appliances, rough furniture, Garden and Yard Erections, and House Building—Cabinet Making and Veneering—Carving and Fretcutting —Upholstery — Painting, Graining, and Marbling — Staining Furniture, Woods, Floors, and Fittings—Gilding, dead and bright, on various grounds—Polishing Marble, Metals, and Wood—Varnishing—Mechanical Movements illustrating contrivances for transmitting motion—Turning in Wood and Metals—Masonry, embracing Stonework, Brickwork, Terracotta, and Concrete —Roofing with Thatch, Tiles, Slates, Felt, Zinc, &c.—Glazing with and without putty, and lead glazing—Plastering and Whitewashing — Paperhanging — Gas-fitting — Bell-hanging, ordinary and electric Systems — Lighting — Warming — Ventilating — Roads, Pavements, and Bridges— Hedges, Ditches, and Drains — Water Supply and Sanitation—Hints on House Construction suited to new countries.

E. & F. N. SPON, 125 Strand, London.

New York: SPON & CHAMBERLAIN, 12 Cortlandt Street.

PAPERHANGINGS.—Free from Arsenic.

Wm. Woollams & Co.

	Per Piece.				
	s.	d.		s.	d.
Machines, Pulps	0	6	to	1	3
,, Grounds	1	0	,,	3	0
,, Satins	1	6	,,	3	0
,, Golds	2	6	,,	6	0
Block, Damasks, Grounds	2	6	,,	10	0
,, ,, Satin	4	6	,,	18	0
,, ,, Mica	6	0	,,	18	0
,, Chintzes	6	0	,,	18	0
Raised Flocks (for painting over)	11	6	,,	20	0
Embossed Leather Papers	14	0	,,	42	0
Patent Embossed Flocks	42	0	,,	84	0
Lacquered Leather Papers	90	0	,,	126	0

WILLESDEN PAPER AND CANVAS.

Willesden waterproof and rot-proof manufactures have now been before the public foraconsiderable period. It is about ten years since papers were read by the eminent chemist, Dr. Alder Wright, F.R.S., D.Sc., before the Society of Arts and Society of Chemical Industry.

The Willesden "2-ply" is now increasingly being used for underlining slate and tile roofs, upon open rafters or boarding; also for lining corrugated iron buildings, and especially for cold storage insulation aboard ship. It is waterproof, rot-proof, vermin-proof, clean, anti-flammable, is easily laid in wide widths overlapping, and makes a warm, solid, air-tight, permanent job.

The "1-ply" is largely used as the most economical and effectual remedy for damp walls (in bad cases using Willesden rot-proof scrim), and underlining valuable paperhangings, &c.

Builders adopt it for dead-sounding floors. A leading firm writes: "We have used your paper to place over sound-boarding between floors where loose, dry, pugging material has been used, and we consider it a very suitable and lasting material for the purpose."

In addition to the few uses we have mentioned, the thin papers are invaluable for art decorative purposes, especially as a base for decoration in oil or distemper, and for making stencils, labels, &c.

The scientific bearing and chemical nature of the Willesden process is well known, and affords a guarantee of the constitution of the products—their impermeable and durable properties, tensile strength, homogeneity, solidity, and general efficiency.

DECORATOR.

Modelled Canvas.

	s.	d.	
In low relief, 2 ft. wide, plain	2	3	per yard.
In painted ornament, with ground	5	6	„
In gilding, with ground	8	0	„

Vellum (same designs).

	s.	d.	
In low relief	1	3	per yard.
In painted ornament, with ground	4	3	„
In gilding, with ground	6	6	„

The colourings may be to any tint given by architects, and the material is planned to suit spaces to avoid waste in matching the pattern.

The freizes and ceilings are in various depths of relief in canvas and vellum, many of them being after old examples.

GLAZIER.

TARIFF PRICES, SUBJECT TO CURRENT RATES OF DISCOUNT.

The largest sizes which can be made in the various substances of sheet glass are as follows, but the extreme limits of length and width cannot be combined in the same sheet:—

	Extreme length.	Extreme width.	Extreme area.
15 ounces. ..	55 inches.	36 inches.	12½ feet.
21 „ ..	84 „	48 „	18 „
26 „ ..	84 „	48 „	17 „
32 „ ..	80 „	44 „	15 „
36 „ ..	70 „	42 „	13 „
42 „ ..	60 „	38 „	11 „

CROWN GLASS. (Usual thickness, exclusive of Glazing.

	Per Foot Super.							
	Best.		2nds.		3rds.		4ths, or coarse.	
	s.	d.	s.	d.	s.	d.	s.	d.
Quarries	—		—		0	3	0	3
Square, 9 in. × 7 in...	0	6	0	5	0	3	0	2½
„ 9 in. × 7 in. to 12 in. × 9 in.	0	6½	0	5½	0	4	0	3
„ 12 in. × 9 in. to 14 in. × 10 in.	0	7½	0	6½	0	4½	0	3½
„ not above 18 in.	0	9	0	7½	0	5½	0	4
„ 1½ ft. to 2 ft.	0	10	0	8½	0	6	0	4½
„ 2 „ „ 3 „	1	0	0	9½	0	6½	0	5
„ 3 „ „ 4 „	1	2	0	11½	0	7½	0	6
„ under 5 ft.	1	6	1	3	0	10	0	8
Extra thickness.								
Square, not exceeding 9 in. × 7 in.	0	8	0	6	0	3½	0	2½
„ „ 12 in. × 9 in.	0	9	0	7	0	5½	0	4
„ „ 14 in. × 10 in.	0	11	0	8½	0	6½	0	5
„ „ 2 ft.	1	4	1	2	0	8½	0	6½
„ „ 3 „	1	6	1	4	0	10	0	7½
„ „ 4 „	1	9	1	6	0	11	0	9
„ „ 5 „		3	1	10	1	3	1	0

Flatting, 2*d.*; polishing, 3*d.*; obscuring, 3*d.*; glazing, 4*d.* per foot extra.

SHEET GLASS. (Exclusive of Glazing.)

In squares, cut to order, not exceeding,			Per Foot Super.					
			Picture Qualities.		Glazing Qualities.			
In area.	In length.	In width.	A.	B.	Best.	2nds.	3rds.	
15 oz.			s. d.	s. d.	s. d.	s. d.	s. d.	
Under 9 by 7	..	..	0 7½	0 6½	0 5	0 3	0 2½	
„ 12 „ 9 & Quarries	..	..	0 9	0 8	0 6½	0 4	0 2½	
„ 14 by 10	..	..	0 10	0 9	0 7	0 4½	0 2½	
Not above 1½ ft.	..	..	0 11	0 10	0 8½	0 5	0 3	
„ 2 ft.	50 in.	36 in.	1 1	0 11	0 9½	0 5½	0 3½	
„ 3 „	..	..	1 2	1 1	0 10	0 6	0 3½	
„ 4 „	..	..	1 3	1 2	0 10½	0 6½	0 3½	
„ 6 „	..	..	1 4	1 3	0 11½	0 7	0 4	
„ 8 „	..	..	1 6	1 4	1 1	0 7½	0 4½	
„ 11 „	..	..	1 8	1 6	1 3	0 8	0 5	
„ 13 „	55 „	38 „	2 0	1 8	1 4	0 9	0 5½	
„ 15 „	60 „	40 „	Not	made	Not made	Not	made	
„ 17 „	65 „	42 „	..	..		..	..	
„ 19 „	70 „	44 „	..	..	..	..	..	
„ 20 „	75 „	46 „	..	..	..	..	..	
„ 21 „	80 „	48 „	..	..	..	..	..	
„ 22 „	85 „	49 „	..	..	..	..	..	
21 oz.								
Under 9 by 7	..	..	0 8½	0 7½	0 6½	0 4½	0 3	
„ 12 „ 9 & Quarries	..	..	0 10	0 9	0 7½	0 5	0 3½	
„ 14 by 10	..	..	0 11	0 10	0 8½	0 5½	0 4	
Not above 1½ ft.	..	..	1 1	0 11	0 9½	0 6	0 4½	
„ 2 ft.	50 „	36 „	1 2	1 0	0 10½	0 6½	0 4½	
„ 3 „	..	..	1 3	1 1	0 11½	0 7½	0 5	
„ 4 „	..	..	1 4	1 2	1 1	0 8	0 5½	
„ 6 „	..	..	1 5	1 3	1 1½	0 8½	0 6	
„ 8 „	..	..	1 6	1 4	1 2	0 9	0 6½	
„ 11 „	..	..	1 8	1 6	1 4	0 10	0 7	
„ 13 „	55 „	38 „	1 10	1 7	1 5	0 11	0 7½	
„ 15 „	60 „	40 „	2 5	2 2	1 7	1 0	0 8½	
„ 17 „	65 „	42 „	Not	made	1 10	1 2	0 10	
„ 19 „	70 „	44 „	..	..	2 3	1 5	1 0	
„ 20 „	75 „	46 „	..	..	2 9	1 8	1 3	
„ 21 „	80 „	48 „	..	..	..	2 0	1 7	
„ 22 „	85 „	49 „	..	..	..	2 6	2 0	

SHEET GLASS. (Exclusive of Glazing.)—*continued.*

In squares, cut to order, not exceeding,			Per Foot Super.					
			B.	Glazing Qualities.				
In area.	In length.	In width.		Best.		2nds.	3rds.	
	26 oz.		s. d.	s. d.		s. d.	s. d.	
Under 9 by 7	..	..	0 9	0 8		0 6	0 4	
„ 12 „ 9 & Quarries	..	..	0 10	0 9		0 6½	0 5	
„ 14 by 10	..	..	0 11	0 10		0 7	0 5½	
Not above 1½ ft.	..	..	1 1	0 11½		0 7½	0 6	
„ 2 ft.	50 in.	36 in.	1 2	1 0		0 8	0 6½	
„ 3 „	..	..	1 3	1 1		0 8½	0 6½	
„ 4 „	..	..	1 4	1 2		0 9	0 7	
„ 6 „	..	..	1 5	1 3		0 9½	0 7½	
„ 8 „	..	..	1 7	1 4		0 10	0 8	
„ 11 „	..	..	1 8	1 5		0 11	0 8½	
„ 13 „	55 „	38 „	1 10	1 6		1 0	0 9	
„ 15 „	60 „	40 „	2 3	1 9		1 1	0 10	
„ 17 „	65 „	42 „	Not	2 3		1 3	0 11	
„ 19 „	70 „	44 „	made	2 9		1 7	1 2	
„ 20 „	75 „	46 „	..	Not		2 0	1 6	
„ 21 „	80 „	48 „	..	made		2 6	2 0	
„ 22 „	85 „	49 „	..	..		3 0	2 6	
	32 oz.							
Under 9 by 7	..	..	1 2	0 11		0 8	0 6½	
„ 12 „ 9 & Quarries	..	..	1 3	1 0		0 8½	0 7	
„ 14 by 10	..	..	1 4	1 1		0 9	0 7½	
Not above 1½ ft.	45 in.	34 in.	1 6	1 3		0 9½	0 8	
„ 2 ft.	..	..	1 8	1 4		0 10½	0 8½	
„ 3 „	..	..	1 10	1 6		0 11½	0 9	
„ 4 „	..	..	1 11	1 7		1 1	0 10	
„ 6 „	..	..	2 0	1 8		1 2	0 10½	
„ 8 „	..	..	2 2	1 10		1 4	0 11	
„ 11 „	50 „	36 „	2 5	2 0		1 6	1 0	
„ 13 „	55 „	38 „	2 9	2 3		1 7	1 1	
„ 15 „	60 „	40 „	3 1	2 7		1 11	1 4	
„ 17 „	65 „	42 „	3 6	3 0		2 4	1 8	
„ 19 „	70 „	44 „	Not	3 4		2 8	2 0	
„ 20 „	75 „	46 „	made	Not		3 3	2 6	
„ 21 „	80 „	48 „	..	made		Not	3 0	
„ 22 „	85 „	49 „	..	..		made	3 3	

SHEET GLASS. (Exclusive of Glazing.)—*continued.*

In squares, cut to order, not exceeding,			Per Foot Super.		
			Glazing Qualities.		
In area.	In length.	In width.	Best.	2nds.	3rds.
	36 oz.		*s. d.*	*s. d.*	*s. d.*
Under 9 by 7	..	..	1 2	0 10	0 8
„ 12 „ 9 & Quarries	..	..	1 4	0 11	0 9
„ 14 by 10	..	..	1 6	1 0	0 10
Not above 1¼ ft.	45 in.	34 in.	1 9	1 2	0 11
„ 2 ft.			1 10	1 3	1 0
„ 3 „	..	..	1 11	1 4	1 1
„ 4 „	..	..	2 0	1 5	1 2
„ 6 „	..	..	2 2	1 6	1 3
„ 8 „	..	..	2 5	1 9	1 4
„ 11 „	50 „	36 „	2 7	1 11	1 5
„ 13 „	55 „	38 „	2 10	2 3	1 8
„ 15 „	60 „	40 „	3 3	2 9	2 0
„ 17 „	65 „	42 „	4 0	3 3	2 6
„ 19 „	70 „	44 „	Not	made	3 0
„ 20 „	75 „	46 „	..	..	Not
„ 21 „	80 „	48 „	..	..	made
„ 22 „	85 „	49 „	..	..	..
	42 oz.				
Under 9 by 7	..	..	1 6	1 3	1 0
„ 12 „ 9 & Quarries	..	..	1 8	1 4	1 1
„ 14 by 10	..	..	1 10	1 5	1 2
Not above 1¼ ft.	45 „	34 „	2 0	1 6	1 3
„ 2 ft.			2 1	1 7	1 4
„ 3 „	..	..	2 4	1 9	1 5
„ 4 „	..	..	2 6	1 10	1 6
„ 6 „	..	..	2 9	2 1	1 7
„ 8 „	..	..	3 0	2 2	1 8
„ 11 „	50 „	36 „	3 3	2 5	1 10
„ 13 „	55 „	38 „	3 6	2 8	2 1
„ 15 „	60 „	40 „	4 0	3 3	2 6
„ 17 „	65 „	42 „	Not	4 0	3 3
„ 19 „	70 „	44 „	made	Not	4 0
„ 20 „	75 „	46 „	..	made	Not
„ 21 „	80 „	48 „	..	..	made
„ 22 „	85 „	49 „	..	..	..

Fluted Sheet—15 oz. and 21 oz., not above 43 in. long, in crates, 2*d.* per ft., and in squares, not above 2 ft. sup., 3*d.* per ft., above 2 ft., 4*d.* per ft.; 15 oz. and 21 oz., 44 to 50 in. long, in crates, 3½*d.* per ft., and in squares, not above 2 ft. sup., 4½*d.* per ft., above 2 ft., 5½*d.* per ft.—more than the prices of 3rds sheet; 26 oz. and 32 oz., in crates and in squares, double the prices of Fluted 15 oz. and 21 oz. respectively. Of each size and substance.

Obscured Sheet, of all substances, in crates, 1*d.*, in squares, 1½*d.*, and in quarries, 1¾*d.* per ft., more than the prices of 3rds sheet. Of each size and substance.

Rubbing, 4½*d.* per ft. extra gross.

Grinding edges, 5*d.* per lineal ft. gross.

Bending—at special prices, according to quantity, &c.

Embossed glass, 1*s.* 8*d.* to 5*s.* per superficial foot.

Patent Plate Glass.

This glass is supplied of two colours—the usual (*i. e.* crystal), and the extra-white, which is almost colourless. For glazing purposes, the usual is preferable, as being harder, more lustrous, and less liable to be scratched in cleaning. In these respects, patent plate, of this kind, is as superior to thick polished plate as it is to that of the extra white colour; but for engravings, water-colour drawings, miniatures, &c., extra white patent plate is, so far at least as colour is concerned, unrivalled. It is only manufactured of Nos. 1 and 2 thicknesses.

Patent Plate Glass. (Exclusive of Glazing.)

Explanation of thicknesses, Nos. 1, 2, 3, and 4.		Usual Colour—at per Foot Superficial.															
		Best Quality. B.				Second Quality. C.				Third Quality. CC.							
Average thickness.	Average weight.	No.1.	No.2.	No.3.	No.4.	No.1.	No.2.	No.3.	No.4.	No.1.	No.2.	No.3.	No.4.				
		s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*				
No. 1, $\frac{1}{16}$ in.	13 oz. per ft.	2 9	2 9	2 9	2 9	2 5	2 5	2 5	2 5	2 2	2 2	2 2	2 2				
No. 2, $\frac{1}{8}$ "	17 "	3 0	3 0	3 0	3 1	2 9	2 9	2 9	2 9	3 2	3 2	3 2	3 2				
No. 3, $\frac{1}{16}$ "	21 "	3 6	3 6	3 6	3 8	3 0	3 1	3 1	2 2	7 2	8 2	8 2	8 2				
No. 4, $\frac{1}{4}$ "	to $\frac{1}{2}$ in. 24 "	3 10	3 11	4 0	4 2	3 5	3 6	3 7	2 8	8 3	9 3	1 3	2 3				
Squares.		4 3	4 4	4 6	4 8	3 10	3 11	4 1	2 11	4 3	5 3	6 3	3 3				
Above	Not exceeding in area	4 7	4 9	4 10	5 0	4 2	4 4	4 5	3 4	5 3	8 3	9 3	4 0				
10 × 8 in.	.. 12 × 9 in.	4 9	4 11	5 0	5 4	4 4	4 5	4 6	3 5	7 3	10 3	11 4	5 4				
12 × 9 "	.. 1 ft.	5 3	5 5	5 8	6 0	4 9	4 10	5 0	3 8	9 4	12 4	1 5	6 5				
1 ft. "	.. 2 "	5 9	5 11	6 2	6 6	5 3	5 4	5 6	4 0	10 5	1 5	2 5	7 5				
2 "	.. 3 "	6 3	6 5	6 8	7 0	5 8	5 9	6 0	4 3	11 5	2 5	3 5	8 5				
3 "	.. 4 "	6 9	7 0	7 3	7 6	6 2	6 3	6 5	4 6	12 6	3 6	4 6	9 6				
4 "	.. 5 "	7 3	7 5	7 9	8 0	6 7	6 8	6 10	4 9	1 6	4 6	5 6	10 6				
5 "	.. 6 "	7 9	8 0	8 3	8 6	7 1	7 2	7 4	5 0	2 6	5 6	6 6	11 6				
6 "	.. 7 "	8 3	8 5	8 9	9 0	7 6	7 7	7 9	5 3	3 6	6 6	7 6	12 6				
7 "	.. 8 "	8 9	9 0	9 3	9 6	8 0	8 1	8 3	5 6	4 6	7 6	8 6	1 7				
8 "	.. 10 "	9 3	9 5	9 9	10 0	8 5	8 6	8 8	5 9	5 6	8 6	9 6	2 7				
10 "	.. 13 "	10 0	10 2	10 6	10 9	9 1	9 2	9 4	6 1	6 6	9 6	10 6	3 7				
12 "	.. 15 "	10 6	10 8	11 0	11 3	9 6	9 7	9 9	6 4	7 6	10 6	11 6	4 7				
13 "	.. 16 "	11 0	11 2	11 6	11 9	9 11	10 0	10 2	6 7	8 6	11 6	12 6	5 7				
14 "	.. 17 "	11 6	11 8	12 0	12 3	10 4	10 5	10 7	6 10	9 6	12 6	1 7	6 7				
15 "	.. 18 "	12 0	12 2	12 6	12 9	10 9	10 10	11 0	7 1	10 6	1 7	2 7	7 7				
16 "	.. 19 "	12 6	12 8	13 0	13 3	11 2	11 3	11 5	7 4	11 6	2 7	3 7	8 7				
17 "	.. 20 "	13 0	13 2	13 6	13 9	11 7	11 8	11 10	7 7	12 6	3 7	4 7	9 7				
18 "	.. 21 "	13 6	13 8	14 0	14 3	12 0	12 1	12 3	7 10	1 7	4 7	5 7	10 7				
19 "	.. 22 "	14 0	14 2	14 6	14 9	12 5	12 6	12 8	8 1	2 7	5 7	6 7	11 7				
20 "	.. 23 "	14 6	14 8	15 0	15 3	12 10	13 0	13 2	8 4	3 7	6 7	7 7	12 7				
21 "	.. 24 "	15 0	15 2	15 6	15 9	13 3	13 4	13 6	8 7	4 7	7 7	8 7	1 8				
22 "	.. 25 "	15 6	15 8	16 0	16 3	13 8	13 9	13 11	8 10	5 7	8 7	9 7	2 8				
23 "	.. 26 "	16 0	16 2	16 6	16 9	14 1	14 2	14 4	9 1	6 7	9 7	10 7	3 8				
24 "	.. 27 "	16 6	16 8	17 0	17 3	14 6	14 7	14 9	9 4	7 7	10 7	11 7	4 8				
25 "	.. 28 "	17 0	17 2	17 6	17 9	14 11	15 0	15 2	9 7	8 7	11 7	12 7	5 8				
26 "	.. 29 "	17 6	17 8	18 0	18 3	15 4	15 5	15 7	9 10	9 7	12 7	1 8	6 8				
27 "	.. 30 "	18 0	18 2	18 6	18 9	15 9	15 10	16 0	10 1	10 7	1 8	2 8	7 8				
28 "	.. 31 "	18 6	18 8	19 0	19 3	16 2	16 3	16 5	10 4	11 7	2 8	3 8	8 8				
29 "	.. 32 "	19 0	19 2	19 6	19 9	16 7	16 8	16 10	10 7	12 7	3 8	4 8	9 8				
30 "	.. 33 "	19 6	19 8	20 0	20 3	17 0	17 1	17 3	10 10	1 8	4 8	5 8	10 8				
31 "	.. 34 "	20 0	20 2	20 6	20 9	17 5	17 6	17 8	11 1	2 8	5 8	6 8	11 8				
32 "	.. 35 "	20 6	20 8	21 0	21 3	17 10	18 0	18 2	11 4	3 8	6 8	7 8	12 8				
33 "	.. 36 "	21 0	21 2	21 6	21 9	18 3	18 4	18 6	11 7	4 8	7 8	8 8	1 9				
34 "	.. 37 "	21 6	21 8	22 0	22 3	18 8	18 9	18 11	11 10	5 8	8 8	9 8	2 9				
35 "	.. 38 "	22 0	22 2	22 6	22 9	19 1	19 2	19 4	12 1	6 8	9 8	10 8	3 9				
36 "	.. 39 "	22 6	22 8	23 0	23 3	19 6	19 7	19 9	12 4	7 8	10 8	11 8	4 9				
37 "	.. 40 "	23 0	23 2	23 6	23 9	19 11	20 0	20 2	12 7	8 8	11 8	12 8	5 9				
38 "	.. 41 "	23 6	23 8	24 0	24 3	20 4	20 5	20 7	12 10	9 8	12 8	1 9	6 9				
39 "	.. 42 "	24 0	24 2	24 6	24 9	20 9	20 10	21 0	13 1	10 8	1 9	2 9	7 9				
40 "	.. 43 "	24 6	24 8	25 0	25 3	21 2	21 3	21 5	13 4	11 8	2 9	3 9	8 9				
41 "	.. 44 "	25 0	25 2	25 6	25 9	21 7	21 8	21 10	13 7	12 8	3 9	4 9	9 9				
42 "	.. 45 "	25 6	25 8	26 0	26 3	21 10	22 0	22 2	13 10	1 9	4 9	5 9	10 9				
43 "	.. 46 "	26 0	26 2	26 6	26 9	22 3	22 4	22 6	14 1	2 9	5 9	6 9	11 9				
44 "	.. 47 "	26 6	26 8	27 0	27 3	22 8	22 9	22 11	14 4	3 9	6 9	7 9	12 9				
45 "	.. 48 "	27 0	27 2	27 6	27 9	23 1	23 2	23 4	14 7	4 9	7 9	8 9	1 10				
46 "	.. 49 "	27 6	27 8	28 0	28 3	23 6	23 7	23 9	14 10	5 9	8 9	9 9	2 10				
47 "	.. 50 "	28 0	28 2	28 6	28 9	23 11	24 0	24 2	15 1	6 9	9 9	10 9	3 10				
48 "	.. 51 "	28 6	28 8	29 0	29 3	24 4	24 5	24 7	15 4	7 9	10 9	11 9	4 10				
49 "	.. 52 "	29 0	29 2	29 6	29 9	24 9	24 10	25 0	15 7	8 9	11 9	12 9	5 10				
50 "	.. 53 "	29 6	29 8	30 0	30 3	25 2	25 3	25 5	15 10	9 9	12 9	1 10	6 10				
51 "	.. 54 "	30 0	30 2	30 6	30 9	25 7	25 8	25 10	16 1	10 9	1 10	2 10	7 10				
52 "	.. 55 "	30 6	30 8	31 0	31 3	25 10	26 0	26 2	16 4	11 9	2 10	3 10	8 10				
53 "	.. 56 "	31 0	31 2	31 6	31 9	26 3	26 4	26 6	16 7	12 9	3 10	4 10	9 10				
54 "	.. 57 "	31 6	31 8	32 0	32 3	26 8	26 9	26 11	16 10	1 10	4 10	5 10	10 10				
55 "	.. 58 "	32 0	32 2	32 6	32 9	27 1	27 2	27 4	17 1	2 10	5 10	6 10	11 10				
56 "	.. 59 "	32 6	32 8	33 0	33 3	27 6	27 7	27 9	17 4	3 10	6 10	7 10	12 10				
57 "	.. 60 "	33 0	33 2	33 6	33 9	27 11	28 0	28 2	17 7	4 10	7 10	8 10	1 11				
58 "	.. 61 "	33 6	33 8	34 0	34 3	28 4	28 5	28 7	17 10	5 10	8 10	9 10	2 11				
59 "	.. 62 "	34 0	34 2	34 6	34 9	28 9	28 10	29 0	18 1	6 10	9 10	10 10	3 11				
60 "	.. 63 "	34 6	34 8	35 0	35 3	29 2	29 3	29 5	18 4	7 10	10 10	11 10	4 11				
61 "	.. 64 "	35 0	35 2	35 6	35 9	29 7	29 8	29 10	18 7	8 10	11 10	12 10	5 11				
62 "	.. 65 "	35 6	35 8	36 0	36 3	29 10	30 0	30 2	18 10	9 10	12 10	1 11	6 11				
63 "	.. 66 "	36 0	36 2	36 6	36 9	30 3	30 4	30 6	19 1	10 10	1 11	2 11	7 11				
64 "	.. 67 "	36 6	36 8	37 0	37 3	30 8	30 9	30 11	19 4	11 10	2 11	3 11	8 11				
65 "	.. 68 "	37 0	37 2	37 6	37 9	31 1	31 2	31 4	19 7	12 10	3 11	4 11	9 11				
66 "	.. 69 "	37 6	37 8	38 0	38 3	31 6	31 7	31 9	19 10	1 11	4 11	5 11	10 11				
67 "	.. 70 "	38 0	38 2	38 6	38 9	31 11	32 0	32 2	20 1	2 11	5 11	6 11	11 11				
68 "	.. 71 "	38 6	38 8	39 0	39 3	32 4	32 5	32 7	20 4	3 11	6 11	7 11	12 11				
69 "	.. 72 "	39 0	39 2	39 6	39 9	32 9	32 10	33 0	20 7	4 11	7 11	8 11	1 12				

EXTRA-WHITE PATENT PLATE—at per Foot Superficial.
The Thicknesses are the same as those of Patent Plate of the "Usual Colour."

Squares.

Above	Not exceeding in area		No. 1.	No. 2.
		Best Quality. B.	s. d.	s. d.
1 ft. ..	2 ft.	and not exceeding in length 50 in., or	4 1	4 4
5 „ ..	6 „		4 11	5 3
10 „ ..	12 „	in width 36 in.	5 9	6 3
		Second Quality. C.		
1 ft. ..	2 ft.	and not exceeding in length 50 in., or	3 7	3 11
5 „ ..	6 „		4 5	4 9
10 „ ..	12 „	in width 36 in.	5 3	5 9
		Third Quality. CC.		
1 ft. ..	2 ft.	and not exceeding in length 50 in., or	2 7	2 8
5 „ ..	6 „		3 4	3 6
10 „ ..	12 „	in width 36 in.	4 2	4 3

HAYWARD'S PATENT PAVEMENT LIGHTS.

Note.—The size of lenses in the various patterns is as follows: No. 2, 4 in. × 3 in.; No. 3, 3 in. hexagonal; No. 4, 14 in. × 6 in.; No. 5, 4 in. × 13 in.; No. 8, 6 in. × 6 in.; No. 9, 6 in. × 12 in.; No. 10, 12 in. × 12 in.

The initial letter denotes the kind of lens.

		Per foot super. Stock sizes.		Made to order.	
		s.	d.	s.	d.
Rough Plate Lights for inside floors,	No. 10 D	4	0	5	0
„ „ pavements,	Nos. 2, 4, 5, 8, or 9 D	4	6	5	6
Convex Lens Lights,	No. 2 or 4 CC	5	0	6	0
Corrugated „	No. 8	5	0	6	0
Oxford „	No. 8	5	6	6	6
Buttons „	Nos. 2, 4, or 8 EE	6	0	7	0
Checkered „	Nos. 4 or 8 E	6	6	7	6
„ „	No. 10 E	7	0	8	0
Small Semi-prism Lights,	No. 2 K	6	0	7	0
Patent „ „	No. 2 B	7	6	8	6
„ „ „	No. 4 B	8	6	9	6
„ „ „	No. 3 B	9	0	10	0
Ornamental Tile and Lens Lights,	No. 50 CC or 51 CC	8	0	12	0
„ „ „	Semi-prism, No. 50 B or 51 B	9	0	12	0

Raised Water Bars on back of lights, 6d. per foot run extra.

BRITISH POLISHED PLATE GLASS. (Exclusive of Glazing.)

In plates containing not above	Per super. foot.							
	Ordinary Glazing.		Best Glazing.		Silvering Quality.		Charge for Silvering.	
	s.	d.	s.	d.	s.	d.	s.	d.
1 ft. super... ..	1	9	1	11	2	2	0	10
2 „ ..	1	10	2	0	2	3	0	10
3 „ ..	2	0	2	2	2	6	1	0
4 „ ..	2	1	2	3	2	8	1	0
5 „ ..	2	2	2	4	2	9	1	0
6 „ ..	2	4	2	7	2	11	1	0
7 „ ..	2	6	2	9	3	1	1	1
8 „ ..	2	7	2	10	3	3	1	1
10 „ ..	2	8	2	11	3	5	1	3
12 „ ..	2	9	3	0	3	6	1	3
14 „ ..	2	9	3	0	3	6	1	3
16 „ ..	2	9	3	0	3	7	1	3
18 „ ..	2	9	3	0	3	8	1	3
20 „ ..	2	9	3	0	3	8	1	4
25 „ ..	2	9	3	0	3	8	1	4
30 „ ..	2	11	3	3	3	9	1	5
35 „ ..	2	11	3	3	3	9	1	7
40 „ ..	3	0	3	4	3	10	1	7
45 „ ..	3	0	3	4	3	10	1	8
50 „ ..	3	1	3	5	4	0	1	9
55 „ ..	3	1	3	5	4	0	1	10
60 „ ..	3	2	3	6	4	2	1	11
65 „ ..	3	2	3	6	4	2	2	0
70 „ ..	3	3	3	8	4	4	2	2
75 „ ..	3	3	3	8	4	6	2	4
80 „ ..	3	3	3	8	4	9	2	6
85 „ ..	3	3	3	10	5	0	2	10
90 „ ..	3	4	4	0	5	4	3	4
95 „ ..	3	5	4	3	5	8	4	0
100 „ ..	3	6	4	6	6	0	5	0

Larger plates, or plates exceeding 160 inches long or 96 inches wide, at higher prices.

The usual thickness of polished glass is about ¼ inch, but if required to be selected of special thicknesses, the following prices will be charged:—

Exact ¼ in. or ¼ in. bare, 3*d.* per foot additional.
$\frac{5}{16}$ths .. .. .. 6*d.* „ „
$\frac{3}{8}$ths .. .. .. 4*d.* „ „
$\frac{7}{16}$ths .. .. .. 4*d.* „ „

Grinding edges of glass not above $\frac{7}{16}$ths thick, one farthing per lineal inch, net; above $\frac{7}{16}$ths thick, at special prices.

Polishing edges not above $\frac{7}{16}$ths inch thick, three half-pence per lineal inch, net; above $\frac{7}{16}$ths thick, at special prices.

The charge for re-polishing glass is 1*s.* per foot net, for each side polished.

EXTRA THICK POLISHED PLATE GLASS. (Exclusive of Glazing.)

In plates containing not above	Per Foot Super.									
	¼ in.		⅜ in.		½ in.		⅝ in.		1 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
2 ft. super.	4	2	4	7	5	0	5	9	6	0
4 ,, ...	4	4	4	9	5	3	6	0	6	3
6 ,, ...	4	6	5	0	5	6	6	3	6	6
9 ,, ...	4	8	5	3	5	9	6	6	6	9
12 ,, ...	4	10	5	6	6	0	6	9	7	0
15 ,, ...	5	0	5	9	6	3	7	0	8	0
20 ,, ...	5	3	6	0	6	6	7	6	9	0
25 ,, ...	5	6	6	3	6	9	—		—	
30 ,, ...	5	9	6	6	7	0	—		—	
35 ,, ...	6	0	6	9	7	6	—		—	
40 ,, ...	6	3	7	6	8	6	—		—	
45 ,, ...	6	6	8	0	—		—		—	
50 ,, ...	7	0	8	6	—		—		—	

Larger plates at special prices.

ROUGH CAST PLATE GLASS, in Thicknesses as under.

In plates containing not above	Per Foot Super.									
	¼ in.		⅜ in.		½ in.		⅝ in.		1 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
1 ft. super.	0	8	0	9	0	9½	3	0	4	0
2 ,, ...	0	8½	0	9	0	9½	3	2	4	2
3 ,, ...	0	9	0	9½	0	10	3	4	4	4
4 ,, ...	0	9	0	9½	0	10	3	5	4	5
5 ,, ...	0	9½	0	10	0	10½	3	6	4	6
6 ,, ...	0	9½	0	10	0	10½	3	6	4	6
7 ,, ...	0	10	0	10½	0	11	3	7	4	7
8 ,, ...	0	10	0	10½	0	11	3	7	4	7
9 ,, ...	0	10½	0	11	0	11½	3	8	4	8
10 ,, ...	0	10½	0	11	0	11½	3	8	4	8
15 ,, ...	0	11	0	11½	1	0	3	9	4	9
20 ,, ...	0	11	0	11½	1	0	3	9	4	9
30 ,, ...	0	11½	1	0	1	0½	3	10	4	10
40 ,, ...	0	11½	1	0	1	0½	3	10	5	0
50 ,, ...	1	0	1	0½	1	1	3	11	—	
60 ,, ...	1	0	1	0½	1	1	4	0	—	

Grinding one side, 9*d*. per ft. } for all sizes and
,, both sides, 1*s*. 6*d*. per ft. } thicknesses.

BENDING POLISHED AND ROUGH PLATE GLASS, not over ¼ in. thick, to ordinary Curves.

Polished.	Per Foot.	
	s.	d.
In plates under 6 ft. super. .. .. .. net	2	0
,, ,, 12 ft. ,, ... ,,	2	6
,, ,, 20 ft. ,, ... ,,	3	0
,, ,, 40 ft. ,, ... ,,	3	6
,, ,, 60 ft. ,, ... ,,	4	0

Rough Glass 3*d*. per foot less than the above.

HARTLEY'S PATENT ROUGH PLATE GLASS. (Per foot super.)

	Thickness.			
	¼ in.	⅜ in.	½ in.	⅝ in.
	s. d.	s. d.	s. d.	s. d.
Plain glass, in squares, under 10 in. × 8 in.	0 5	0 7	0 9	1 0
Plain glass, in squares, under 3 ft. sup.	0 7	0 10	0 11	1 3
Plain glass, in squares, under 10 ft. sup.	0 9	1 0	1 1	1 5
Fluted glass, in squares, under 10 in. × 8 in.	0 6	0 8	0 10	1 0
Fluted glass, in squares, under 3 ft. sup.	0 9	1 0	1 2	1 6
Fluted glass, in squares, under 10 ft. sup.	0 11	1 2	1 4	1 8

MOORE'S CIRCULAR GLASS REVOLVING VENTILATORS.

	26 oz.	Plate.
	£ s. d.	£ s. d.
1 ft. super. .. .. each	0 14 0	0 17 0
2 ft. „ .. .. „	1 2 0	1 7 0
4 ft. „ .. .. „	1 15 0	2 4 0
5 ft. „ .. .. „	2 0 0	2 10 0
6 ft. „ .. .. „	2 2 0	2 16 0

	£ s. d.
Moore's Patent No. 1 Quality Louvre Ventilators, 12 in. × 12 in. each	1 5 0
Ditto ditto 12 „ × 24 „ „	1 19 2
Ditto ditto 20 „ × 24 „ „	2 8 9
Ditto ditto 24 „ × 30 „ „	3 0 6

LEAD LIGHTS GLAZED WITH CROWN GLASS. (Per foot super.)

	s. d.
Square, 6 in. × 4 in.	1 2
„ 4 „ × 4 „	1 4

St. Pancras Ironwork Co.'s Prismatic Pavement Lights, p. c. from 8*s.* 6*d.* per foot super.

GLASS TILES.

Rolled Rough Plate. Sheet.

Thickness.	Plain.	Fluted. Small Pattern.	Fluted. Large Pattern.	Substance.	
	s. d.	s. d.	s. d.		s. d.
¼ in. each	0 10	0 10½	0 11	16 oz. each	0 6
5/16 „ „	0 11	0 11½	1 0	21 „ „	0 8
⅜ „ „	1 0	1 0½	1 1	26 „ „	0 10
½ „ „	1 6	1 8	1 10	32 „ „	1 0
⅝ „ „	2 0	2 2	2 4		

Corrugated Tiles—double price.

Glass Slates.

Rough Plate.

		Thickness.							
		⅛	3/16	¼	⅜	½			
		s. d.	s. d.	s. d.	s. d.	s. d.			
Duchess ..	24×12 each	1 3	1 6	1 9	2 1	2 8			
Small Imperials	20×14 „	1 2	1 5	1 8	2 0	2 7			
Small Duchess	22×12 „	1 2	1 5	1 8	2 0	2 7			
Countess ..	20×10 „	0 11	1 1	1 3	1 6	1 10			
Viscountess..	18×10 „	0 10	1 0	1 1	1 4	1 8			
Large Ladies	16×10 „	0 9	0 11	1 0	1 3	1 6			
Ladies	16× 8 „	0 8	0 9	0 10	1 0	1 2			
Doubles ..	13× 7 „	0 6	0 7	0 8	0 10	1 0			

Sheet.

		16 oz.	21 oz.	26 oz.	32 oz.
		s. d.	s. d.	s. d.	s. d.
Duchess ..	24×12 each	0 9	1 1	1 4	1 8
Small Imperials	20×12 „	0 8	1 0	1 3	1 7
Small Duchess	22×12 „	0 8	1 0	1 3	1 6
Countess ..	20×10 „	0 7	0 10	1 0	1 3
Viscountess..	18×10 „	0 6	0 9	0 11	1 1
Large Ladies	16×10 „	0 6	0 8	0 10	1 0
Ladies	16× 8 „	0 5½	0 7	0 8	0 10
Doubles ..	13× 7 „	0 5	0 6	0 7	0 8

Patent Plain Rolled Rough Plate.—Per superficial foot.

The principal uses of this Glass are for railway sheds, public buildings, factories, workshops, skylights, offices, and other purposes, where the object is to intercept the vision but not the light.

——	Plain, i. e. with fine lines on the surface.			
	⅛	3/16	¼	⅜
	d.	d.	s. d.	s. d.
	6	7½	0 9	0 11
	6½	8	0 9½	1 0
Squares, cut to the sizes, not exceeding, in area—				
9 × 7	5	6	0 7	0 8
2 feet	6½	8	0 9½	0 11½
4 „ 100 in. long, 32 in. wide ..	7	8½	0 10	1 0
10 „ „ „	8	9½	0 11	1 1
20 „ 110 in. long, 34 in. wide ..	9	10½	1 0	1 3
30 „ above 120 in. long, or 36 in. wide	—	11½	1 1	1 4
Quarries	6	7½	—	—

Rough cast plate is supplied in ¼ and ⅜ thicknesses, at the same price as plain rolled.

Grinding Edges, 4*d.* per lineal foot gross.

Obscuring on the Rough Side, 6*d.* per foot gross, for size not exceeding 90 inches long.

Bending.—At special prices, according to thickness, kind, quantity, and curve.

PATENT FLUTED ROLLED ROUGH PLATE.—Per superficial foot.

	FLUTED (exclusive of Glazing).							
	No. 2, Small Pattern. About 11 flutes to the in.				No. 1, Large Pattern. About 4 flutes to the in.			
	⅛	3/16	¼	⅜	⅛	3/16	¼	⅜
	d.	*d.*	*s.* *d.*	*s.* *d.*	*d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
	6½	8	0 9½	0 11½	7	0 8½	0 10	1 1
	7	8½	0 10	1 1	8	3 9½	0 11	1 3
Squares cut to the sizes, not exceeding, in area—								
9 × 7	5½	6½	0 7½	0 8½	6	0 7	0 8	0 9
2 feet	7	8½	0 10	1 0	7½	0 9	0 10½	1 1
4 „ 100 in. long, 32 in. wide..	7½	9	0 10½	1 1	8	0 9½	0 11	1 2
10 „ „ „ ..	8½	10	0 11½	1 2	9	0 10½	1 0	1 3
20 „ 110 in. long, 34 in. wide..	9½	11	1 1	1 4	10	1 0	1 2	1 6
30 „ above 120 in. long, or 36 in. wide	—	—	—	—	—	—	—	—
Quarries	6½	8	—	—	—	—	—	—

PATENT DIAMOND AND QUARRY ROLLED ROUGH PLATE.—Per superficial foot.

The principal uses of these kinds of Rolled Plate are for lecture rooms, government offices, banks, asylums, churches, chapels, schoolrooms, &c.	DIAMOND.				QUARRY.							
					Small Pattern.				Large Pattern.			
	⅛	3/16	¼		⅛	3/16	¼		⅛	3/16	¼	
	s. *d.*	*s.* *d.*	*s.* *d.*		*s.* *d.*	*s.* *d.*	*s.* *d.*		*s.* *d.*	*s.* *d.*	*s.* *d.*	
Squares, cut to sizes under— 8 × 6..	0 8	0 9	0 10		0 9	0 11	1 1		1 0	1 0	1 3	
14 × 10 and under 1½ ft. super.. if the length does not exceed 20 inches	0 9½	0 11½	1 3		1 0	1 3	1 6		1 2	1 5	1 8	
1½ ft. sup., and under 3 ft sup., or if above 20, and not above 30 inches long	0 10	1 0	1 4		1 1	1 4	1 7		1 3	1 6	1 9	
6 ft. sup., and under 8 ft. sup., or if above 40, and not above 45 inches long	1 0	1 3	1 7		1 5	1 8	1 11		1 7	1 10	2 1	
12 ft. sup., and under 13 ft. sup., or if above 65, and not above 70 inches long	1 2	1 5	1 9		1 8	1 10	2 2		1 10	2 0	2 3	
14 ft. sup., and under 15 ft. sup., or if above 75, and not above 85 inches long	1 4	1 7	2 0		1 10	2 0	2 4		2 0	2 2	2 5	

PATENT DIAMOND PLATE—*continued.*

Diamond Rough Plate has a bright and brilliant appearance. The pattern is of a lozenge shape, and in relief upon the body of the glass.

Patent Quarry Rolled Plate is used as a substitute for leaded quarries. For buildings of an ecclesiastical character, the Large Pattern, which is of the size of the ordinary Quarry Ten, is preferable; but for other purposes, and windows of small dimensions, the Small Pattern, which is about one-fourth only of the size of the other, is recommended. Iron Saddle Bars, for forming the joints—3d. per running foot net.

PRICE LIST OF PATENT (VALERE) TRANSLUCENT ENAMELLED GLASS.

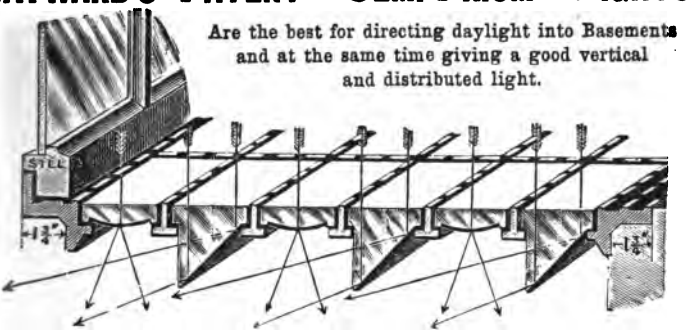
On White Venetian Rippled Glass	..	..	..	from	3s. 6d.	per foot super.
„ „ Medieval „ „	..	..	..	„	4s. 6d.	„	„
„ „ Muranese Glass	..	..	..	..	..	„	5s. 6d.	„	„
„ ¼-in. Rough Plate „	..	..	..	..	..	„	6s. 0d.	„	„
„ Tinted Medieval Rippled Glass	..	..	..	„	7s. 6d.	„	„
„ ¼-in. Polished Plate Glass	..	..	..	..	„	10s. 0d.	„	„
Border	„	3s. 0d.	per foot run.

THE HELLIWELL PATENT SYSTEMS OF IMPERISHABLE GLAZING WITHOUT PUTTY.

Many millions of feet have been fixed on these systems throughout the country and abroad. The bars are of steel, with either copper, zinc or lead caps, the latter having a patent copper clip, which, whilst allowing for expansion and contraction, prevents lead from puckering on the glass. The systems are applicable to every kind of roof, and curved roofs can be glazed with straight glass. It is absolutely watertight, and all outside painting is saved. Used extensively by H.M. Government, and School Boards, Municipal Authorities, and all the leading Railway Companies at home and abroad. "Olympia," Kensington ($3\frac{3}{4}$ acres glass and zinc), was covered on Helliwell's systems. For prices apply Helliwell and Co., Limited, 9, Victoria Street, Westminster; and Brighouse, Yorkshire.

16 MEDALS AWARDED.

HAYWARD'S PATENT "SEMI-PRISM" LIGHTS



Are the best for directing daylight into Basements and at the same time giving a good vertical and distributed light.

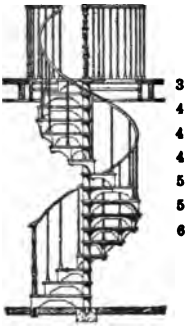
3000 Frames, or stock sizes, always on hand.

Ornamental Tile and Lens Lights,

ILLUMINATING CELLAR FLAPS.

Over 75 establishments fitted with Hayward's Lights in Bond Street, London, alone.

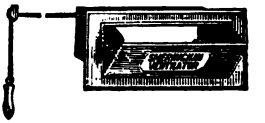
IRON STAIRCASES.



3 ft. 6 in. diam.
4 ft. 0 in. „
4 ft. 3 in. „
4 ft. 6 in. „
5 ft. 0 in. „
5 ft. 6 in. „
6 ft. 0 in. „

VENTILATORS.

MICA FLAP OUTLET.



SHERINGHAM INLET.

HAYWARD BROTHERS & ECKSTEIN,

Engineers and Ironfounders,
UNION STREET, BOROUGH, LONDON, S.E.

[To face p. 320.

TRADE **"JHILMIL"** *MARK.*

PATENT METAL LATH

For Fireproofing Buildings.

Used at the Lyceum, Strand, Haymarket, Princess's, Savoy, St. James's, Surrey, &c. &c.

Architects should specify "JHILMIL" METAL LATH.
See pages 258, 277.

"SAFFORD RADIATORS."

With Right and Left Screwed Nipple Connections

TESTED TO 120 LBS.

NO BOLTS. NO PACKING NO LEAKS.

200 Sizes in Stock in 4 Different Patterns.

Architects should send for new Catalogue before closing Hot Water Heating contracts.

The Cheapest and Best, 1s. 8d. to 2s. per ft. super. *See page* 295.
Illustrated Catalogue and Estimates on application.

HAYWARD BROTHERS & ECKSTEIN,

SHOW ROOMS AND WORKS,
187 to 193 Union Street, Borough, London, S.E.

VENTILATORS.

Comyn, Ching, & Co.'s,	10 in. × 4 in.	each 5s. 6d.
„ „	11 in. × 7 in.	„ 6s. 6d.
„ „	10 in. × 9 in.	„ 9s. 6d.
Ditto, with brass plate	11 in. × 7 in.	„ 12s. 6d.
„ „	16 in. × 11 in.	„ 25s.

HAYWARD'S SHERINGHAM VENTILATOR (ECKSTEIN'S IMPROVED PATENT).

Prices include balance weight, 3 yards cord, and leading pulley.

Quality. Size of Box / Size of Front	A 9 × 3 in. 11½ × 5½ in.	C 9 × 6 in. 11 × 8½ in.	B 13½ × 6 in. 16 × 8½ in.	D* 15 × 10 in. 19 × 14 in.
	s. d.	s. d.	s. d.	s. d.
No. 1. Iron—Plain..	A 1..4 0	C 1.. 5 6	B 1.. 7 0	D 1..23 4
6. Do. Japanned bronze ..	A 6..5 0	C 6.. 6 6	B 6.. 8 0	D 6..28 4
2. Do. do. white and gold	A 2..6 0	C 2.. 8 0	B 2..10 6	D 2..32 4
5. Galvanized—Plain	A 5..5 6	C 5.. 7 6	B 5.. 9 6	D 5..30 4*
3. Do. with brass fronts and doors	A 3.18 6	C 3..30 0	B 3..50 0	

* Extra heavy for public buildings.

An air brick as large as the ventilator should be fixed in outside face of wall.

HAYWARD'S FRESH AIR MICA INLET VALVES IN GALVANIZED IRON,

For Ventilating Drains by the Admission of a Current of Fresh Air.

For 3 in. Vertical Pipe.. 8s. 0d. each.	For 3 in. Horizontal Pipe.. 7s. 0d. each.
„ 4 in. „ „ ..10s. 0d. „	„ 4 in. „ „ .. 8s. 6d. „
„ 6 in. „ „ ..17s. 6d. „	„ 6 in. „ „ ..15s. 0d. „

SILK FLAP OUTLET VENTILATORS (Noiseless),

For Prevention of Down Draught in Air-extracting Shafts.

Quality. Size of Front / Size of Box	11½ × 5½ in. 9 × 3 in.	11 × 8½ in. 9 × 6 in.	11 × 11½ in. 9 × 9 in.	15½ × 11½ in. 13½ × 9 in.
	s. d.	s. d.	s. d.	s. d.
Plain..	3 3	5 9	7 0	8 6
Japanned Bronze	3 9	6 9	8 6	10 6
Brass Front	7 6	13 6	20 0	30 0

Also in white and gold.

HAYWARD'S IMPROVED MICA OUTLET VENTILATORS (BOYLE'S PATENT).

Pattern and Quality. Size of Front Size of Box	*11×5 in. 9×3 in.	**11×7 in. 9×5¼ in.	11×9 in. 9×7¼ in.	11×11 in. 9×9¼ in.	16×11 in. 13¼×9¼ in.
	s. d.	s. d.	s. d.	s. d.	s. d.
No. 1 or No. 2. Plain Iron.. ..	4 0	6 0	9 0	11 0	16 0
„ 1 „ 2. Japanned Bronze	5 0	7 0	10 6	13 0	18 0
„ 1 „ 2. White and Gold or Galvanized ..	6 0	8 0	11 6	15 0	20 0
„ 3 „ Brass Trellis Front	7 0	10 6	14 0	18 0	25 0
„ 4 „ Brass Hit-and-Miss Fronts..	..	20 0	25 0	33 0	46 0
„ 5 „ Plain Iron Hit-and-Miss Fronts ..	..	9 6	13 0	16 6	22 6

* 5 by 11 in. and **7 by 11 in. Vertical Ventilators, at same prices; also larger sizes, 18 by 18 in. and 18 by 24 in., prices on application.

HAYWARD'S ORNAMENTAL INLET (OR TOBIN) VENTILATORS.

Quality. Pattern / Size	No. 1. 9 × 3 in.	No. 1. 9 × 4 in.	No. 2. 9 × 3¼ in.	No. 2. 9 × 4¼ in.	No. 3. 12 × 4 in.	No. 3. 12 × 5 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Plain Iron..	23 0	27 0	24 0	28 0	34 0	38 0
Japanned..	31 0	35 0	33 0	37 0	40 0	44 0
Galvanized	38 0	42 0	40 0	44 0	50 0	56 0

These Ventilators are made 5 ft. 6 in. high.

HAYWARD'S UNIVERSAL VENETIAN VENTILATORS.

Size of Front.	10 in. × 8 in.		12 in. × 10 in.		14 in. × 12 in.		16 in. × 14 in.		18 in. × 12 in.	
Pattern.	Enamelled. Black.	Gold.	Enamelled. Black.	Gold.	Enamelled. Black.	Gold.	Enamelled. Black.	Gold.	Enamelled. Black.	Gold.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
A Self-indicating	6 6	8 6	8 6	12 6	12 6	16 6	..	..	16 6	20 6
B Plain Lattice .	6 6	8 6	8 6	12 6	12 6	16 6	..	..	..	..
D Florentine ..	..	..	10 0	13 6	14 6	18 6	..	..	..	..
E Persian	7 0	9 6	9 6	13 0	14 0	18 0	..	..	..	..
F Brilliant . .	7 6	10 0	10 0	13 6	14 6	18 6	..	..	..	..
C Indian Lattice	..	..	..	..	14 0	18 0	17 0	21 0	..	..
G Japanese. ..	7 0	9 6	9 6	13 0	14 0	18 0	..	..	..	..

FRESH AIR MICA INLET VALVES (in Galvanized Iron),
For Ventilating Drains, by the Admission of a Current of Fresh Air.

	s. d.		s. d.
For 3 in. Vertical Pipe ..	8 0	For 3 in. Horizontal Pipe..	7 0
„ 4 „ ..	10 0	„ 4 in. „ ..	8 6

THE BLACKMAN FAN. Prices and Particulars.

Diam.	Price. Type I.	Price. Type II.	Revolutions per minute.	Cubic feet of air moved per minute, with free inlet and exit.	Actual h.p. required.	Delivery Surface.
in.	£ s.	£ s.				Sq. ft.
14	3 10	2 15	1,000 to 1,500	1,000 to 1,500	¼ to ½	1·0
18	5 0	4 0	700 „ 1,200	2,000 „ 3,000	½ „ ¾	1·75
24	7 0	6 0	500 „ 900	3,000 „ 6,000	¾ „ 1¼	3·1
30	10 0	8 0	450 „ 750	5,000 „ 9,000	1¼ „ 1¾	4·9
36	13 0	10 10	400 „ 650	7,700 „ 14,000	1¾ „ 1¾	7·0
42	16 0	13 10	350 „ 600	11,500 „ 20,000	1¾ „ 1¾	9·5
48	19 0	16 10	300 „ 550	13,500 „ 30,000	1 „ 2½	12·5
54	25 0	21 10	300 „ 450	17,000 „ 36,000	1½ „ 3	15·9
60	31 0	26 10	240 „ 400	21,000 „ 45,000	1½ „ 3½	19·6
72	45 0	42 0	200 „ 350	30,000 „ 60,000	2 „ 5	28·2
84	*	*	180 „ 320	45,000 „ 90,000	3 „ 7	38·0
96	*	*	150 „ 280	54,000 „ 120,000	4 „ 10	50·0
108	*	*	140 „ 250	68,000 „ 144,000	5 „ 12	63·6
120	*	*	120 „ 220	82,000 „ 180,000	6 „ 15	78·4

The ELECTRIC BLACKMAN FAN and Motor combined, same diameters as above up to 48 in. Prices, up to 30 in. inclusive, complete, ready for fixing to opening, £1 per inch of diameter of blades. Larger sizes on application.

The above table is based on long practice. It shows that the higher the speed the greater is the power required for a given volume. As a rule, a larger size run slowly is better than a smaller driven fast, except in some drying processes, where considerable resistance is inevitable, with its consequent reduction of volume moved. For ventilation, if the Blackman be properly applied, such resistance and loss can be avoided, and the "free inlet and outlet" duty or volume obtained; but if the best arrangement practicable should leave a resistance of ½-in. of water gauge to be overcome, then the volume of air moved will be about one-half, and if 1¼ inch of water gauge the volume will be only about one-sixth of that given in the table.

One special claim made for the Blackman is that it does its work at a very moderate speed, thereby greatly economising motive power.

No system of ventilation, whether mechanical or not, can be satisfactory in practice unless the air passed through the building or room be warmed as it enters. This essential condition may have been ignored in years past with comparative impunity where the quantity of air actually passed through was often inconsiderable; but when the quantity of air handled per minute is certain and considerable, the necessity for combining warming with ventilation is at once admitted. It may be easy to warm a building so long as the air in it is practically stagnant, but let the air it contains be renewed every 15 or 20 minutes, or oftener; and the demand for heating surface, of the right kind and quantity, properly arranged, becomes imperative; and unless it be provided accordingly, the temperature will go down to an uncomfortable level.

To meet these conditions, and after considerable experience, the Blackman Ventilating Company have devised and are prepared to supply apparatus with heating surface enough to warm all the large quantity of air moved by their fans, up to the temperature required; some of those at work raise as much as 25,000 cubic feet *per minute* from normal temperature up to 120° when required; this has not any scorching or injurious effect, and provision is made for the admission with this warmed air of any desired proportion of fresh air, thus giving complete control.

In public buildings the Blackman is often used for blowing fresh air into the lower storey, where it is warmed and filtered, or moistened, as may be desired, before being distributed by suitable means to the several apartments; but in industrial buildings the fan is generally used for exhausting, which favours distribution of effect much more than blowing in, and is generally more suitable for the purpose. This, as a rule, is not ordinary ventilation, but the removal of some local impurity or floating nuisance, such as heat, steam, dust, or fumes, smoke, &c., given off from defined sources, but which, if not removed direct, spreads and vitiates the whole atmospheric contents of the factory, doing damage often also to plant and premises.

There are many industrial establishments in which the Blackman fan is used for drying the raw material or the finished product, where the large quantity of air required for the drying is taken from adjoining rooms—often through several in succession—thus ventilating them thoroughly without additional cost of working; and the heat that would otherwise be injurious and annoying in other rooms is thus utilised for the drying process. In the same way warm air that has been used for a drying purpose is often passed forward through a room in which steam is given off, absorbing the steam and carrying it away outside.

Stall Board Lights.	Per foot super. Stock sizes.	Made to order.
	s. d.	s. d.
Ornamental Stall Board Lights, glazed with rolled glass, Nos. 22 or 24 D	4 0	.. 5 0
Ornamental Stall Board Lights, glazed with button lenses, Nos. 22 or 24 E or 24 EE	5 6	.. 7 6
Ornamental Stall Board Lights, glazed with semi-prism lenses, Nos. 22 or 24 A	7 6	.. 8 6

Ventilating Panels in lieu of glasses, no extra.

Ventilating Hopper Frames, fitted to open, each, extra 10s. and 15s.

Roadway Lights for Horse and Cart Traffic.

Extra Strong Roadway Lights, Hayward's, No. 11 B	—	.. 14 6
" " " " No. 11 C	—	.. 11 0
" " " " No. 11 D	—	.. 9 6
Hayward's Patent Spring Balanced Opening Flaps.. Rolling Lights, with brass rollers, carriages, and runners	per foot super. extra to above prices.	6 0 .. 10 0 to to
Registered Opening Lights, balanced on racks and quadrants		10 0 .. 12 0

Lights for Underground Urinals and Conveniences, Railway Platform and Subway Lights, as per special quotation.

Special quotations for quantities on application.

VENTILATORS.

IMPROVED PATENT SELF-ACTING EXHAUST ROOF VENTILATORS.

Galvanized Steel, painted.

Head.	Pipe.	No. 1 and No. 1A.	Turret.	No. 2.	No. 3.	No. 4.
in. diam.	in.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
12	5 to 7	1 10 0	..	..	..	..
14	6 „ 8	1 16 0	..	..	..	..
16	7 „ 9	2 12 6	2 10 0	3 15 0	5 0 0	5 15 0
18	8 „ 10	3 5 0	3 0 0	4 10 0	6 0 0	6 15 0
20	9 „ 11	3 17 6	3 12 6	5 10 0	7 5 0	8 5 0
24	10 „ 13	5 5 0	4 17 6	7 10 0	10 0 0	11 15 0
27	11 „ 14	6 5 0	5 17 6	9 10 0	12 5 0	14 0 0
30	12 „ 16	7 10 0	7 0 0	11 10 0	14 15 0	16 10 0
36	14 „ 20	10 0 0	9 10 0	16 10 0	20 10 0	23 0 0
42	16 „ 24	12 0 0	11 5 0	18 15 0	23 10 0	26 15 0
48	20 „ 28	15 10 0	14 15 0	24 10 0	29 10 0	33 5 0
50	24 „ 32	19 10 0	18 10 0	32 10 0	38 0 0	41 0 0

HOBBS & CO.'s Patent Ventilators for Strong Rooms .. .. from 1*l.* 10*s.* each.
„ „ „ Ventilated Box Lintel .. .. „ 8*l.* 10*s.* „

IMPROVED RIDGE VENTILATOR.

In galvanized steel or zinc, painted with enamel paint.

May also be arranged below ridge, so as to form an invisible roof ventilator

Price list ex works, Liverpool, subject to alteration without notice.

No. 1.

	£ s. d.
1 ft. 0 in. long, 132 in. clear super.	2 7 6
1 „ 6 „ „ 196 „ „	2 18 6
2 „ 0 „ „ 266 „ „	4 2 6
2 „ 6 „ „ 330 „ „	5 0 0
3 „ 0 „ „ 396 „ „	6 5 0
3 „ 6 „ „ 462 „ „	7 7 6
4 „ 0 „ „ 528 „ „	8 10 0

SUNDRIES.

(*Continued from page* 297.)

COTTAM AND WILLMORE'S PATENT STABLE FITTINGS.

New Patent Ventilating Sill and Head-Piece, for giving efficient through ventilation in ranges of loose boxes or stalls.

It also keeps the woodwork well away from all damp, and so preserves it.

	£	s.	d.
For Stalls, sill only .. .. each	1	5	0
For Loose Boxes, sill only .. .. per foot	0	3	0
Ventilating Head-Pieces .. .. each	1	15	0
Stall Manger and Rack, plain .. .. each from £1 15 0 to	4	0	0
„ „ enamelled .. .. .. „ 2 10 0 „	4	12	6
„ „ and Water Trough .. „ 2 0 0 „	5	10	0
„ „ „ „ enamelled „ 2 10 0 „	7	0	0

Loose Box Fittings—

Manger and Rack, plain .. .. „	1 14 0	„	2 10	0
„ „ enamelled .. .. „	2 15 0	„	4 15	0
Rack Manger and Water Trough, plain .. .. „	2 17 6	„	4 17	6
„ „ „ enamelled .. „	3 17 6	„	5 12	6
Corner Mangers .. .. „	0 10 6	„	2 2	0
Stall Post Ramp and Sill .. .. „	0 18 0	„	6 5	0
Loose Box Railing .. ..per foot from	6 5 6	„	0 11	6
„ Doors .. .. each „	2 10 0	„	5 0	0
Cottam's Improved Spherical Centre Coach-house and Stable-door Hinges .. .. 1 ft. 9 in. per pair	0	8	0
„ „ „ „ 2 ft. 0 in. „	0	9	0
„ „ „ „ 2 ft. 6 in. „	0	10	6
„ „ „ „ 3 ft. 0 in. „	0	13	0
„ „ „ „ 3 ft. 6 in. „	0	15	0
„ „ „ „ 4 ft. 0 in. „	1	3	0

Cottam's "Claremont" Sanitary Stable Gutter, with fall in itself.

Saves all pots, and does away with under-drains in stable. Estimates Free.

Patent Sanitary Stable Gulley, new pattern .. .. each	2	0	0
Hayward's Patent 1893 Sanitary Stall Fittings, with stoneware mangers and water-troughs .. .. each from	3	5	0

	Plain.			Galvanized.		
	£	s.	d.	£	s.	d.
Improved Circular Stable Ventilating Sash, 19½ in. diam. each	0	8	6 ..	0	11	6
„ „ „ „ 24 in. „ „	0	10	6 ..	0	14	6
„ „ „ „ 31 in. „ „	0	18	6 ..	1	7	6
Cast-iron Swing Sash and Frame, No. 27, 3 ft. 3 in. × 1 ft. 8 in. .. ..each	0	12	0			
Double „ „ „ No. 28, 3 ft. 3 in. × 3 ft. 3 in. .. .. „	1	4	0			

Patent Sheringham and other Stable Ventilators.

Improved Noiseless Halter Guides, with strong leather strap and chain-end .. .. each	0	10	6 to	0	15	0
Ventilating Wrought-iron Harness Brackets, riding, enamd., per set from	0	11	0			
„ „ „ „ driving „ „	0	16	6			
Cow Fittings, per cow .. .. from	1	12	0			

Speaking Tubes.

	¼ in.	½ in.	1 in.	1½ in.	
Zinc	5*d.*	5½*d.*	6*d.*	7½*d.*	per foot.
Copper	8*d.*	8½*d.*	9*d.*	1*s.* 4*d.*	„

Mouthpiece, with whistle, ivory, each, 7*s.* 6*d.*
Black's mouthpiece, with bell and whistle, from 13*s.* to 30*s.*

Norton's Improved Patent Turnstiles.

(Le Grand & Sutcliff, Bunhill Row, London, E.C.)

Prices.	£	*s.*	*d.*
Registering turnstile (semi-circular) .. .. each	12	0	0
Non-registering ditto, for exit	9	0	0
Middle Rail	1	7	0
Money Boxes	0	18	0
"In" or "Out" plates	0	12	0

If fitted with "Silent Action," 10*s.* extra.
If fitted with "Norton's Latest Improved Indicator," £1 5*s.* extra.

Elsley's Patent Sash Lever.

	Iron.	Part Gun-metal.
To open 1 sash	18*s.* 6*d.*	30*s.*
„ 2 „	23*s.* 6*d.*	36*s.*
„ 4 „	38*s.* 6*d.*	48*s.*

Blinds.

	Per foot.
Outside blinds, striped linen tick, including cases ..	2*s.* 6*d.*
Inside blinds, white linen, including roller, &c. ..	6½*d.*
Ditto, including roller and spring	9*d.*
Venetian, painted	10*d.*

Fire Hose.

	1 in	1½ in.	2 in.	3 in.
Leather, copper riveted ..	1*s.* 9*d.*	2*s.* 1*d.*	2*s.* 7*d.*	3*s.* 6*d.*
Canvas	9*d.*	1*s.*	1*s.* 2*d.*	1*s.* 7*d.*

Tye & Andrews' Patent Sink Trap.

	3 in.	4 in.	6 in.
Each ..	7*s.* to 10*s.*	8*s.* 3*d.* to 13*s.* 9*d.*	37*s.* 6*d.* to 43*s.* 9*d.*

Patent Articles.

Miscellaneous. Prices at Warehouse.

Bavin's stoneware dip-traps, each, 10*s.*
Stiff's interceptor sewer air-trap, 6 in., each, 15*s.*
„ „ „ „ 9 in. „ 25*s.*

Approximate Price List of Lifts.

No.	Class.	Load.	Height.	Size of Cage.	Price D/D.	Fixing in London.
		cwt.	ft.	ft. in. ft. in. ft. in.	£ s. d.	£ s. d.
1	Dinner Lift ..	¼	20	2 0×1 6×2 6	13 10 0	4 0 0
2	Coal Lift. ..	1	20	2 6×1 9×2 6	18 0 0	5 0 0
3	Passenger Lift.	3	20	3 6×3 0×6 6	35 0 0	5 0 0
4	Goods Lift ..	5	30	3 6×3 0×4 6	27 10 0	7 0 0
5	Goods Lift ..	10	30	4 0×4 0×6 0	39 0 0	9 0 0
6	Furniture Lift	7	30	6 0×4 0×7 0	47 10 0	10 10 0

These prices include gear, with efficient brake, guides, ropes, cage, and balance weight.

Patent Automatic Water-Saving Arrangements.

R. Waygood & Co. say they have recently patented an invention by which the consumption of water in lifts and cranes, instead of always being the same, is apportioned to the actual load raised, thereby effecting a very considerable saving. This apparatus can be fitted to existing lifts and cranes at very slight inconvenience and comparatively low cost, and can be seen working in the City and West End, and also in Liverpool, Birmingham and Manchester. In some cases an actual saving of over 50 per cent. has been absolutely proved. Particulars and explanations will be gladly afforded on request.

Messrs. R. Waygood & Co. also say they make hydraulic and other power-driven lifting machinery, but cannot publish prices for same, as these vary according to the pressure of water, or motive power available, load to be raised, height of lift, and size and style of cage.

Galvanized Wire Netting.

Prices per Lineal Yard, 2 ft. high. Other heights in proportion. Made up in 50-yard rolls.

Size of Wire.	Purpose generally used for.															Size of Wire.
	Aviaries, &c.			Pheasantries, &c.				Rabbits and Hares.		Hares, Dogs, and Poultry.		Training Plants.				
	Mesh.			Mesh.				Mesh.		Mesh.		Mesh.				
	1	¾	½	⅜	1	1¼	1½	1¼	1⅝	2	2½	3	3½	4	6 in.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
22	2 9	2 0														22
20	3 0	2 3	1 3													20
19	—	2 6	1 6	1 2	0 11	0 10	0 9	0 6	0 4½	0 4½	0 4	0 3	0 2½	0 2½		19
18	—	2 9	1 9	1 4	1 1¼	1 0	0 11	0 7	0 6	0 5	0 5	0 4	0 3½	0 3½	0 2½	18
17	—	—	—	1 9	1 6	1 5	1 3	0 9	0 7	0 6½	0 6	0 5	0 4	0 4	0 3½	17
16	—	—	—	2 3	2 0	1 8	1 6	0 11	0 9	0 8	0 7	0 6	0 5½	0 4½	0 4	16
15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0 5	15
14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0 6	14

By Special Appointment to H.M. The Queen.

R. WAYGOOD & CO.,

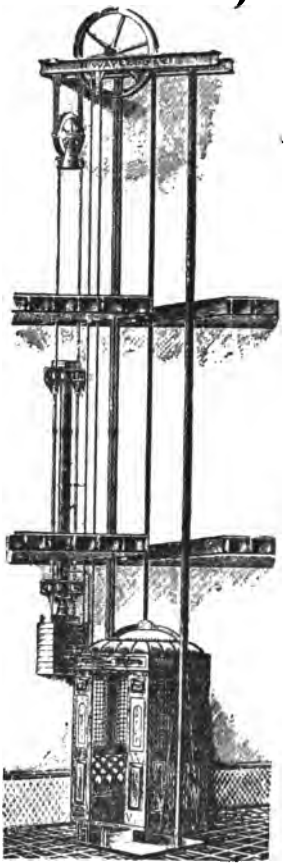
LIMITED,

Manufacturers, Designers and Patentees

OF

LIFTS, CRANES AND HOISTS,

FOR ALL PURPOSES, AND TO SUIT ALL CONDITIONS.



ELECTRIC LIFTS.

PATENT

WATER-SAVING LIFT

For Goods and Passenger Traffic.

COLONIAL MACHINERY.

IRON DOORS, &c.

APPLY FOR CATALOGUE.

FALMOUTH RD., GT. DOVER ST.,

LONDON, S.E.

BRANCHES AT

LIVERPOOL, MANCHESTER, BIRMINGHAM, BRADFORD.

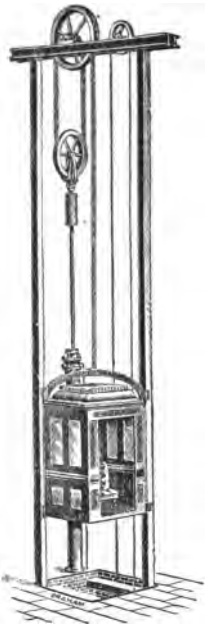
[*To face page* 328.

EASTON, ANDERSON, & GOOLDEN,

— LIMITED. —

3 WHITEHALL PLACE, S.W.

And ERITH IRONWORKS, KENT.



Hydraulic Lift.

LIFTS.

FIRST CLASS

HYDRAULIC,

ELECTRIC AND

HAND POWER.

WATER-SAVING, VARIABLE-POWER PATENT LIFTS.

PERFECT SAFETY.

ELECTRIC LIGHTING.

WATER SUPPLIES,

Hydraulic Rams, Pumps, &c.

EASTON, ANDERSON & GOOLDEN, LTD.

ENGINEERS.

Telegraphic Address: "EGYPTIAN, LONDON." Telephone No. 3695.

4-in. Hexagon Mesh Wire Sheep-netting, 3 ft. wide, with strong flexible wire-rope selvages; much used by Home and Colonial Sheep Farmers:—

Gauge	No. 16	15	14	13	Lineal.
	8*d.*	10*d.*	1*s.*	1*s.* 3*d.*	per yard, galvanized.

Galvanized Netting Staples, 1 in. .. .. 7*s.* per 1000.

Wrought Iron Netting Standards, Galvanized—	2 ft.	2½ ft.	3½ ft.	4 ft.	6 ft.
	9*s.*	11*s.*	13*s.*	18*s.*	24*s.* doz.

Sliding Door Gearing.

Wrought Iron Roller Carriages.	5	6	7	8 in. wheels.
Straight Strape—	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Iron Rollers	8 0	9 0	10 0	12 0 per pair.
Gun Metal	13 6	15 0	19 0	24 0 „
Cranked Strape—				
Iron Rollers	22 0	24 0	27 0	32 0 „
Gun-Metal	27 6	30 0	36 0	44 0 „
Steel travel bars, with brackets for fixing to wood lintels, &c.—Trued and primed, 2½ × ⅝ in.				2 6 per foot.
Floor Channel Iron				0 9 „
Guide Pins				2 0 per pair
Angle „				4 0 „

Cast Iron over-head Carriages to receive travel bars and cornice, for—

	6	7	8 in. wheels.
	s. *d.*	*s.* *d.*	*s.* *d.*
Single	7 0	8 6	10 0 each.
Double	10 0	12 0	14 0 „
Treble	14 6	16 0	20 0 „
Steel travel bars, ⅛ round edge, trued and primed, 2½ × ⅝ in.			2 0 per foot.
„ „ „		3 × ⅛ in.	3 0 „

Iron Doors.

Panelled Party-wall Doors and Frames	.. ..	11*s.* 6*d.* per super. foot.
Sliding „ „ „	.. ..	10*s.* 0*d.* „
Hobbs & Co.'s Patent „ „	.. ..	14*s.* to 20*s.* „

Strong-room Doors, £15 10*s.* to £350; Ventilating Gates, £8 to £30.

Engraving.

P. G. Meek & Co.'s Price List.

Brass plates, 1*d.* per sq. in.; engraving, 3*s.* per foot run.
Bevelled brass letters, for windows, 6*d.* per in.
Opal glass letters, up to 4 in., 2*d.* per in.
Wood letters, plain gilt, up to 12 in., 2½*d.* per in.
Half-round or bevelled gilt, up to 12 in., 6*d.* per in.

Stanley's Drawing Instruments.

(Great Turnstile, London, W.C.)

Improved T-squares, 24 in., 2*s.* and 4*s.*; 31 in., 3*s.* and 5*s.*; 42 in., 5*s.* and 7*s.*
Drawing boards, compensated, 23 by 16 in., 3*s.* 6*d.* and 4*s.* 6*d.*; 31 by 23 in., 6*s.* 6*d.* and 9*s.*; 42 by 29 in., 15*s.*
Set squares, vulcanite, 60°, 6 in., 8*d.*; 8 in., 1*s.*; 10 in., 1*s.* 6*d.*; 45°, 6 in., 1*s.*; 8 in., 1*s.* 6*d.*
Architects' and builders' scales, 12 in., box, 2*s.* 9*d.*; ivory, 8*s.* 6*d.*
Rolling parallel rules, 12 in., ebony, 7*s.*; ivory edges, 12*s.*; bronze, 20*s.*
Pocket compasses, pillar or Napier, 12*s.*, 20*s.*, and 32*s.*
Drawing pens, 1*s.* 6*d.* and 2*s.*; lifting nibs, 2*s.* 3*d.*, 4*s.* 6*d.*, and 6*s.*
Dividers, 2*s.* 6*d.* and 5*s.*; with hair spring, 7*s.* and 8*s.*
Pocket cases of instruments, 18*s.*, 2*l.* 2*s.*, 4*l.* 4*s.*, and 6*l.* 6*s.*
Cases of instruments for offices, 1*l.* 1*s.*, 2*l.*, 5*l.*, to 20*l.*

Stanley Instruments for Architects' and Builders' Work on Land.

Theodolite, transit, first quality. 5 in., 25*l.* 10*s.*; 6 in., 28*l.* 10*s.*
„ architects', for setting out work, 10*l.* 10*s.*
Semi-circumferenter, for setting out angles, 2*l.* and 3*l.* 5*s.*
Levels, first quality, 12 in., 11*l.* and 13*l.*; 14 in., 14*l.* 10*s.*
„ for drainage works, &c., telescopic, 3*l.*, 4*l.* 10*s.*, and 8*l.*
Levelling staff, in feet and inches, 10 ft., 1*l.* 1*s.*; 14 ft., telescopic, 2*l.* 5*s.*
Levels, spirit, rosewood, brass plates, 12 in., 5*s.* 6*d.*; 18 in., 8*s.* 6*d.*
Boning rods, set of three, one divided, 14*s.*
10 ft. rods, jointed, strong, each 10*s.*; 5 ft., the pair, best, 10*s.*
Tapes, best linen, 50 ft., 8*s.*; 100 ft., 13*s.*; steel, 50 ft., 1*l.* 1*s.* 6*d.*
Chains, steel, with arrows, 50 ft., 10*s.* 6*d.*; 66 ft., 15*s.*; 100 ft., 1*l.* 4*s.* 6*d.*
Girth strap, leather, for timber measuring, 13*s.*
Timber marker, 3*s.* Timber needle, 5*s.*
Magnetic compass for setting-out building, square form, 5*s.*
Cross staff, open, 10*s.* 6*d.*; box form, 5*s.* to 12*s.*

BLACKMAN VENTILATING CO., LD.

SPECIALISTS IN

WARMING AND VENTILATING,

TRADE MARK

REMOVING HEATED or FOUL AIR, DUST or STEAM, from FACTORIES and WORK-SHOPS, &c. &c.

THOUSANDS OF INSTALLATIONS AT WORK.

The ELECTRIC BLACKMAN, Fan and Motor Combined, extremely convenient of application and economical of current.

THE BLACKMAN SYSTEM OF DRYING TIMBER.

63 Fore Street, London, E.C.

Branches at MANCHESTER, LEEDS, BRISTOL, GLASGOW and BELFAST.

SMITH, POWERS & CO.,

Priory Varnish Works,

COVENTRY, & 84 LEADENHALL ST., LONDON, E.C.

VARNISH AND JAPAN MANUFACTURERS

For DECORATORS, BUILDERS, &c.

SOLE MAKERS OF

POWERS' ORIGINAL TEREBINE.

DOUBLE the strength of any other.

[*To face page* 330.

W. H. HARLING,

MATHEMATICAL, DRAWING, & SURVEYING INSTRUMENT MANUFACTURER,

47 FINSBURY PAVEMENT, LONDON, E.C.

And at Grosvenor Works, Hackney, N.E.

ESTABLISHED 1851.

Contractor to H.M. Government.

Harling's 8-in. Builder's Drainage Level, with Silver Ring Compass and Patent Sights, in Mahogany Case, with Mahogany Tripod Stand, **£6.**

Ditto, ditto, without Compass, **£4 19s.**

Either of above Instruments, without Improved Patent Sights, **15s.** less.

14-ft. Sopwith's Levelling Staff, paper readings, **£1 19s.**

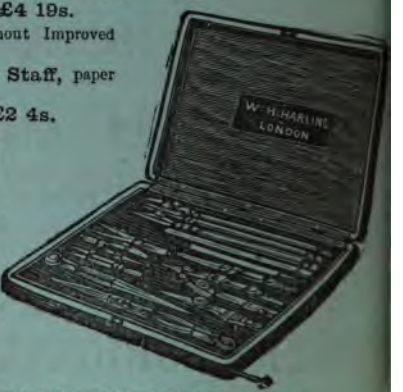
Ditto, ditto, painted readings, **£2 4s.**

Ranging Poles, painted in three colours, 6 ft., **14s.** half doz.; 8 ft. **16s. 6d.** half doz.

Best Scotch Linen Tapes, in Leather Case, 50 ft. **8s.**; 66 ft., **9s.**; 100 ft., **12s.**

Leather Pocket Case, containing 6-in. Needle, pointed half set, Hair Spring Divider, 1 each Ink and Pencil Needle Bows, 3 Spring Bows, 2 Drawing Pens, and 6-in. Ivory Scale, **£3 3s.**

Similar Case, to above, but without Spring Bows, **£2 10s.**



ILLUSTRATED CATALOGUE POST FREE.

W. H. Harling's Drawing Instruments.

(47 Finsbury Pavement, E.C.)

Cases of drawing instruments, 13*s.*, 20*s.*, 30*s.*, 42*s.*, 62*s.*, 80*s.*

Pocket cases of drawing instruments, 21*s.*, 42*s.*, 63*s.*, 90*s.*, 112*s.*

Drawing pens, 1*s.* 8*d.*, 2*s.*, 2*s.* 6*d.*, 4*s.*, 5*s.* 6*d.*

Spring bows, 8*s.* 6*d.*, 11*s.*, 13*s.*, 16*s.*

Beam compasses, 7*s.*, 12*s.*, 16*s.*

Napier compasses, 15*s.*, 20*s.*, 30*s.*

Boxwood scales, 12 in., 1*s.* 6*d.*, 2*s.* 4*d.*, 2*s.* 10*d.*

Jointed pocket rules, 2 ft., 4 fold, 1*s.*, 2*s.* 6*d.*, 7*s.* 6*d.*

Ivory pocket rules, 12*s.*, 13*s.* 6*d.*, 20*s.*

Drawing boards, best quality, with ebony edge, 23 by 16 in., 4*s.* 6*d.*; 32 by 23 in., 8*s.* 6*d.*; 42 by 29 in., 13*s.*

Improved pearwood tee-squares, 24 in., 1*s.* 6*d.*; 32 in., 2*s.*; 42 in., 2*s.* 6*d.*

Mahogany tee-squares, with ebony edge, 24 in., 3*s.* 9*d.*; 32 in., 4*s.* 9*d.*; 42 in., 6*s.* 9*d.*

Set squares, improved transparent, 45°, 4 in., 7*d.*; 6 in., 11*d.*; 8 in., 1*s.* 6*d.*; 60°, 6 in., 9*d.*; 8 in., 1*s.*; 10 in., 1*s.* 6*d.*; 12 in., 2*s.* 3*d.*

French curves, 3*s.* 6*d.* dozen, pearwood.

Stencil plates, any design cut to order.

New Indian ink slab, with cover, rough surface for grinding, 1*s.* 6*d.*

Harling's hexagon pencils for office use, 4°, 1*s.* 2*d.* dozen.

„ liquid Chinese ink, 9*d.* per bottle.

Measuring tapes, best linen, 50 ft., 7*s.*; 66 ft., 8*s.* 6*d.*; 100 ft., 11*s.* 6*d.*

Land chains, iron, 100 links, 8*s.* 6*d.*; 100 ft., 10*s.*

Strong steel, 100 links, 16*s.* 9*d.*; 100 ft., 20*s.*

Arrows, 1*s.*, 1*s.* 6*d.*, and 1*s.* 8*d.* per set.

Magnetic compass in nickel hunter case, 1½ in., 5*s.* 9*d.*; 1¾ in., 6*s.* 6*d* ; 2 in., 7*s.* 3*d.*

Surveyors' rods, best 5 ft. jointed, with spring, 8*s.* pair.

Cross staff head, 5*s.* to 12*s.*

Hutchinson's prismatic compass, in sling case, 35*s.*

Abney's reflecting level for vertical angles, in case, 34*s.*

8-in. drainage level, with Harling's patent sights, in mahogany case, with tripod stand, 4*l.* 19*s.*

5 per cent. Discount off above prices for cash with order.

C. COLLYER & SON'S BLINDS.

Venetian Blinds, painted either green, buff, grey, or stone, to suit the room, 9d. per square foot. Small sizes, under 15 feet, 11s. 6d. each.
If with crimson or scarlet tapes, 1d. per square foot extra.
With patent action, 2s. and 3s. per blind extra.
Rubbing down and painting old Venetian Blinds, with new lines and tapes, 5d. and 5½d. per square foot. Small sizes, under 15 feet, 6s. 6d. each.
Selected pine, stained and varnished, 9d. to 11d. per square foot.
Roller Blinds.—Best Linen Holland Blinds, on rollers, complete, 5½d. per square foot. Large sizes, above 30 feet, 5d. Small sizes, under 15 feet 6s. 6d. each.
Spring Roller Blinds.—Best Linen Holland Blinds, on spring rollers, complete, 8½d. per square foot.
Large sizes, above 30 feet, 8d. Small sizes, under 15 feet, 10s. 6d. each.
New Holland lines and tassels to old springs or rollers, 4½d. per square foot.
Large sizes, above 30 ft., 4d. per square foot. Small sizes, under 15 feet, 5s. 6d. each.
Striped Holland, and brown, drab, buff, and green Holland, same price as above.
White Union Holland, ½d. per foot less than above.
Green, crimson, and blue Tammy, 1½d. and 2d. per foot extra.
Cleaning and glazing old spring blinds, oiling springs, new lines and tassels, 3s. 6d. each.
Ditto, ditto, Roller Blinds, 3s. each.
Curtain-rods and bands for muslin curtains with patent holders, from 1s. per foot run.
Festoon Blinds.—Cotton Twill, 1s. 3d. per square foot.
Rhea Fibre, 1s. 6d. per square foot. Silk, from 2s. per square foot upwards.
Small blinds under 15 square feet charged as 15 feet.
Gauze Wire Blinds, in mahogany frames, painted any plain colour, with bolts, &c., No. 24, 1s. 11d. per square foot. Small sizes, under 4 feet, 8s. each.
Gauze Wire Blinds, in mahogany frames, with bronze or brass tube tops, either straight or sweep, No. 25, 2s. 6d. per square foot. Small sizes, under 4 feet, 10s. each.
The above are the prices for the blinds if quite plain; should ornamental corners, &c., be required, the prices will be increased according to the design.
French-polished frames, 2s., 2s. 6d., and 3s., according to size.
Plain and ornamental writing in gold and colours to order.
New-painted wire to old frames, 1s. to 1s. 3d. per foot.
Leaded Glass Blinds, in French-polished mahogany or oak frames, from 3s. 6d. per square foot upwards, according to design.
A great variety of designs sent on application.
Outside Florentine Blinds, of blue striped ticking, fitted in cases complete, under 20 feet superficial, £2 each. Above 20 feet, 2s. per square foot.
Outside Spanish Blinds, of blue striped ticking, in cases complete, under 20 feet superficial, £2 8s. each. Above 20 feet, 2s. 4d. per square foot.
Fancy pattern ticking, 2d. per foot extra.
Outside Shutter Blinds, painted any colour, 2s. 9d. per square foot. Small sizes, under 20 feet, £2 15s. each.
Sliding Railway Shutter Blinds, with cornice, &c., 3s. 4d. per square foot. Small sizes, under 20 feet, £3 6s. each.
Outside Venetian Blinds, to draw up in cases, painted any colour, under 20 feet, £1 14s. each. Above 20 feet, 1s. 8d. per square foot.
Florentine Blinds, without side wings, of blue striped ticking, under 20 ft. superficial, £1 10s. each. Over that size, 1s. 6d. per square foot.
Fancy pattern ticking, 2d. per foot extra.
Outside Helioscene Sun Blinds, with blue striped ticking, 2s. 6d. per square foot. If under 20 feet superficial, £2 10s. each.
Fancy striped ticking, 2d. per foot extra.
Outside Door or Shop Blind.—The prices of Outside Door or Shop Blinds vary according to the way they are fixed.
Conservatory Roller Blind.—To work on roof, in any length, fitted with strong linen conservatory canvas, with box and roller, price depending on size of conservatory, from 7d. to 10d. per square foot.

Domestic·Water·Supply

HAYWARD-TYLER AND CO.'S RIDER'S PATENT HOUSEHOLD HOT-AIR PUMPING ENGINE, including all latest improvements.

Price List.

No. 2 size on ½ H.P. Engine.

Diam. of Pump.	Diam. of Suction Pipe.	Diam. of Delivery Pipe.	No of Revolutions.	Approx. Quantity per Hour.	Height of Delivery.	Price Ordinary.
in.	in.	in.		gal.	ft.	£
1¼	1	1	120	220	180	50
1½	1¼	1¼	120	320	125	51
1⅝	1¼	1¼	120	360	108	51
1¾	1½	1½	120	440	90	51
2	1½	1½	120	600	70	51
2¼	2	1½	120	720	58	52
2½	2	1½	120	900	45	52

No. 3 size on 1 H.P. Engine.

Diam. of Pump.	Diam. of Suction Pipe.	Diam. of Delivery Pipe.	No. of Revolutions.	Approx. Quantity per Hour.	Height of Delivery.	Price Ordinary.
in.	in.	in.		gal.	ft.	£
1¾	1½	1½	100	530	160	85
2	1½	1½	100	680	125	86
2½	2	1½	100	1100	80	86
2¾	2½	2	100	1320	65	86
3	2½	2	100	1540	55	87
3½	2½	2	90	1900	40	88

Oil Engines.

Prices of Horizontal Engines.

Nominal Horse Power.	Price, including Oil Cistern, Vaporizer, Air Pump, Igniting Apparatus, and all details required for preparation of Oil Vapor.		Extra for Pump for circulating Water round Cylinder, thus doing away with Overhead Piping.	Number of Revolutions.	Pulley. (Extra charge made for this according to size.) The following are the usual dimensions.		Diameter of Fly Wheel.	Approximate Weight of Engine without Water Vessel.
	Without Water Vessel.	With separate Wrought Iron Water Vessel for cooling the Cylinder for Overhead Piping without Circulating Pump.			Diameter.	Width.		
	£ s. d.	£ s. d.	£ s. d.		ins.	ins.	ft. in.	cwt. qrs.
1	90 0 0	94 0 0	5 5 0	180	11	3½	3 2	14 0
2	125 0 0	129 0 0	5 15 0	180	14	4	3 6½	18 0
3	160 0 0	165 10 0	6 0 0	170	16	5	3 11	23 0
5	200 0 0	205 10 0	6 10 0	170	18	6	4 7	26 0
7	235 0 0	242 0 0	7 0 0	160	20	7	5 0	47 0
9	260 0 0	268 10 0	7 10 0	160	24	7½	5 3	55 0
11	285 0 0	294 10 0	8 10 0	160	26½	8	5 6	70 0

Delivered Hull. If London or Liverpool, 30*s.* per ton extra. 5 per cent. charged for packing.

Cost of Oil.

The oil used is about 1·25 pints per actual horse-power per hour for the larger, and about 1·6 pints for the smaller engines with full load. Mineral oil can be purchased in England at about 6½*d.* per gallon, costing from about 1*d.* to 1½*d.* per actual horse-power per hour.

Mode of Working.

The working of the Priestman Oil Engine is so simple that an unskilled person can give all the attention it requires. The motive power is obtained from mineral oil, one or two days' supply being placed in a closed iron vessel inside the foundation of the engine. The oil having been mixed with air under pressure, is drawn into the cylinder and ignited by an electric spark from a small ordinary battery supplied with the engine. To start the engine, after heating the vaporizer a few minutes, it is only necessary to admit a small quantity of oil into the cylinder by taking a turn or two of the fly-wheel. Little or no attention is required in working the engine, and there is no risk in leaving it unattended, as, should the oil become exhausted, the engine will then only cease to run. Detailed working instructions are sent with every engine.

The Pulsometer Patent Steam Pump, manufactured by the Pulsometer Engineering Company (Limited), for builders' and contractors' work. The advantages enumerated as belonging specially to the Pulsometer are its portability and simplicity, its ability to raise sand, gravel, &c., cost, and general handiness. It is a double-acting pump in which the steam, having done its work, is condensed and used to draw the water up the suction pipe. It has no mechanical elements to absorb power or get out of order, the only moving parts being the simple valves, which are replaceable by means of duplicates, had at small cost. It will work suspended on a chain, and can be left running for long periods unattended where work is constant. It can be erected and set to work in a very short space of time. By its use contractors have in many instances been enabled to overcome difficulties which seemed insuperable. When necessary the Pulsometer can be fixed with its boiler on large road wheels, making a very compact portable pumping apparatus, extremely handy for temporary purposes, and where the pump is required to be conveyed from one place to another.

Price of Pulsometers and Fittings.

No.	Height of Pulsometer in Inches.	Space Occupied.	Size of Steam Supply Pipe.	Size of Suction Pipe.	Size of Discharge Pipe.	Imperial Gallons per Hour.	Price.
	in	in.	in.	in.	in.		£
1	16	10 × 9	¼	1½	1	900	8
3	29	22 × 15	½	3	2	3,800	18
5	37	23 × 19	¾	4	3	10,000	32
7	50	28 × 26	1¼	5	4	17,000	55
8	60	35 × 31	1¼	6	5	26,000	80
10	79	47 × 42	2	8	7	52,000	130
11½	98	54 × 48	2	10	8	80,000	170

No.	Price of Foot Valve, advisable in most cases.	Price of Back Pressure Valve, useful in High or Long Deliveries.	Suction and Delivery Pipes and Connections for 40 ft. lift.	Price of Pulsometer with Vertical Boiler, for 40 ft. lift.	Spare Parts Recommended to be sent with Pulsometer sent abroad.
	£ s. d.	£ s. d.	£ s. d.	£	£ s. d.
1	0 15 0	0 15 0	2 0 0	40	1 13 0
3	2 0 0	2 0 0	5 5 0	74	2 14 0
5	3 5 0	2 15 0	8 18 6	111	4 14 0
7	4 10 0	4 0 0	11 15 0		6 6 0
8	6 0 0	4 15 0	14 10 0	On Appli-	9 12 6
10	10 0 0	6 10 0	29 0 0	cation.	16 6 6
11½	11 0 0	7 10 0	..		18 0 6

The above may be had on hire.

Steam Hose and Fittings.

	s. d.		s. d.
½ in.	2 0 per ft.	Clips	4 pairs 7 6
¾ „	2 6 „	„	„ 10 0
1 „	3 4 „	„	„ 15 0
1¼ „	3 9 „	„	„ 18 0
1½ „	4 3 „	„	„ 20 0
2 „	5 3 „	„	„ 30 0

PLANT ON HIRE

Builders' Plant.	No. of Rounds, Treads, &c.	Per Day.	Per Week.	Per Month of 4 weeks.	Per Week after Month.	Deposits.
		s. d.	s. d.	s. d.	s. d.	s. d.
Cradles, Painters', with Gear, complete ..	..	..	12 6	45 0	10 0	80 0
Ladders	15	0 3	0 9	2 3	0 6	5 0
"	20	0 4	1 0	3 0	0 8	6 0
"	25	0 5	1 3	3 9	0 10	9 0
"	30	0 6	1 6	4 6	1 0	12 0
"	35	0 7	1 9	5 3	1 2	15 0
"	40	0 8	2 0	6 0	1 4	18 0
"	45	0 9	2 3	6 9	1 6	21 0
"	50	0 10	2 6	7 6	1 8	24 0
"	55	0 11	2 9	8 3	1 10	27 0
"	60	1 0	3 0	9 0	2 0	30 0
Swing Steps	6, 7, & 8 treads	0 4	1 0	3 0	0 3	8 0
"	9 & 10	0 5	1 3	3 9	0 10	10 0
"	11 & 12	0 6	1 6	4 6	1 0	12 6
"	13 & 14	0 7	1 9	5 3	1 2	15 0
"	15 & 16	0 8	2 0	6 0	1 4	17 6
Trestles, each	6 ft.	0 5	1 3	3 9	0 10	12 6
"	8 ft.	0 6	1 6	4 6	1 0	15 0
"	9 ft.	0 7	1 9	5 3	1 2	17 6
"	10 ft.	0 8	2 0	6 0	1 4	20 0
"	12 ft.	0 9	2 3	6 9	1 6	25 0
"	14 ft.	0 10	2 6	7 6	1 8	30 0
Weston's Pulleys ..	½ ton	1 6	4 6	13 6	3 0	20 0
" " ..	¾ ton	2 0	6 0	18 0	4 0	30 0
" " ..	1 ton.	3 0	9 0	27 0	6 0	45 0
" " ..	2 ton	4 6	13 6	40 0	9 0	60 9
Crabs, Double Purchase	2 ton	10 0	15 0	20 0	5 0	60 0
" " "	3 ton	12 0	18 0	24 0	6 0	80 0
Pulley Blocks	1 Sheave 4½ × ¾	0 3	0 9	2 3	0 6	5 0
"	2 Sheave	0 4	1 0	3 0	0 8	7 0
"	3 Sheave	0 5	1 3	3 9	0 10	10 0
"	1 Sheave 6 × 1	0 4	1 0	3 0	0 8	7 6
"	2 Sheave	0 5	1 3	3 9	0 10	10 6
"	3 Sheave	0 6	1 6	4 6	1 0	15 0
Snatch Blocks	1 Sheave 6 × 1	0 4	1 0	3 0	0 8	7 6
Guide Ropes	..	0 6	1 6	4 6	1 0	10 0
Hemp Falls	¼ inch	0 6	1 6	4 6	1 0	10 0
"	½ inch	0 9	2 3	6 9	1 6	15 0
"	1 inch	1 0	3 0	9 0	2 0	20 0
"	1½ inch	1 3	3 9	11 3	2 6	25 0
Gin Blocks	½ inch	0 4	1 0	3 0	0 8	6 0
"	12 inch	0 6	1 6	4 6	1 0	9 0
"	18 inch	0 8	2 0	6 0	1 4	12 0
Window Cripples ..	per pair	1 0	3 0	9 0	2 3	15 0
Ladders " ..	"	1 0	3 0	9 0	2 3	15 0
Sand Screens	each	0 6	1 6	4 6	1 0	9 0
Sand Sieves	"	0 3	0 9	2 3	0 6	4 0

PLANT ON HIRE—*continued.*

Builders' Plant.	No. of Rounds, Treads, &c.	Per Day.	Per Week.	Per Month of 4 weeks.	Per Week after Month.	Deposits
		s. d.	s. d.	s. d.	s. d.	s. d.
Navvy Barrows	each	0 6	1 6	4 6	1 0	10 0
Putty Tubs	„	0 3	0 9	2 3	0 6	5 0
Floor Dogs	per pair	0 6	1 6	4 6	1 0	7 6
Rammers, Light ..	each	0 3	0 9	2 3	0 6	4 0
„ Heavy ..	„	0 6	1 6	4 6	1 0	10 0
Pickaxe						
Shovels	„	0 3	0 9	2 3	0 6	4 0
Larrys						
Hooks						
Slate Rip						
Scaffold Poles						20 0
„ Boards	per doz.	1 0	1 0	3 0	0 9	15 0
„ Putlogs						10 0
„ Cords						5 0
„ Poles, 30 ft. & over	„	2 0	2 0	6 0	1 6	30 0
Drain Machines	each	2 6	7 6	22 6	5 0	20 0
„ extra rods	„	0 3	0 9	2 3	0 6	2 0
Tarpaulins, for any period over 28 days	18 × 12 ft.		1 0			
„ „	24 × 18 ft.		2 0			

LADDERS, BARROWS, STEPS, &C.

BUILDERS' AND PAINTERS' LADDERS.

With Oak Rounds, at per round.

	s. d.		s. d.
12 rounds and under	0 5	66 and not exceeding 70	0 10½
13 and not exceeding 30	0 6	76 „ „ 80	1 2
31 „ „ 45	0 7	86 „ „ 90	1 8
46 „ „ 55	0 8	96 „ „ 100	2 6

EXCAVATOR'S BARROWS.

	s. d.	
1. Ash frame, elm top, with leg-stay	10 6	each.
2. Ditto, with extra side-stays	12 6	„
3. Stout ash frame, 1-in. elm top, full size. with leg and s de-stays	14 0	„
4. Ditto (extra large), with cleets to sides, and two bolts through frame, and long side iron stays, bolted to bottom of legs.. ..	15 0	„

PAINTERS' AND BUILDERS' TRESTLES.

	Light, for one board at top.	Stout, for two boards at top.
	s. d.	s. d.
6 ft. high	13 0 ..	15 0
9 „	18 0 ..	21 0
12 „	24 0 ..	27 0
16 „	37 0 ..	40 0
18 „	48 0 ..	50 0

The Detroit Patent Sure-grip Steel Tackle Block.

Prices and Capacity.

No.	Using.			Capacity.		s.	d.
3.—	$\frac{3}{8}$-inch rope.	One man can lift	300 lb.;	600 lb.	..	12	6
4.—	$\frac{1}{2}$-inch „	„ „	350 „	1000 „	..	23	0
5.—	$\frac{5}{8}$-inch „	„ „	400 „	1800 „	..	30	0
6.—	$\frac{3}{4}$-inch „	„ „	450 „	2500 „	..	36	0
6½.—	$\frac{3}{4}$-inch „	„ „	850 „	4000 „	..	60	0

Ropes for Falls.

	Per cwt. s.	d.
Superior White Hemp Rope for Falls, 1, 1½, 1¾, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾, and 4 in. circumference	51	4
„ Manilla Rope for Falls, white or oiled	72	4
„ Tarred Hemp Rope for Falls	42	0
„ Tarred Manilla Rope for Falls	67	8

Scaffold Cord in the Coil.

Best Jute	19	0
„ Hemp .. .. 2nd quality, 27*s.*; 1st, 30*s.*; staple	36	0

1 cwt. cuts about 4 doz. cords 16 ft. long.

Whipping, 7*d.* per skein. Cut into lengths and whipped at the ends, 3*s.* per cwt. extra.

	Per. lb. s.	d.
Sash Lines, spun of different sizes	1	0
Whale Line	1	0
Ratline Tarred	0	5
Ranging Lines	1	0
Tarred Jute Pipe Yarn		

Windmills and Tube Wells.

The storage tank can be fixed in the windmill tower, and the windmill so arranged to shut off automatically when the tank is full and to start work again when any water is drawn from it.

The following prices do not include either the pump, tubing, or towers, which vary in height according to the locality in which the windmills are fixed.

Prices of Pumping Windmills.

Diameter.	Price.	Diameter.	Price.
10 ft.	£25 0 0	20 ft.	£100 0 0
12 „	30 0 0	22 „	115 0 0
13 „	35 0 0	25 „	130 0 0
14 „	50 0 0	28 „	145 0 0
16 „	75 0 0	30 „	160 0 0
18 „	85 0 0		

Artesian bored tube wells need only be resorted to in localities where the stratum cannot be penetrated with the driven tube wells, or where it is necessary to go to great depths to reach water. They effectually shut out surface soakage, drainage, and other impurities, which so frequently percolate through the steining of sunk shafts, and contaminate the supply.

Artesian bored tube wells may be safely fixed at the bottom of dug wells, where the supply has become polluted, the impure water being effectually excluded by our special system; they may also be used in this manner for augmenting failing supplies. The water from the dug well can be drawn from as usual whilst the boring is proceeding.

Approximate prices for Artesian bored tube wells, from 3 inches to 12 inches in diameter, exclusive of lining tubes, but including all labour and use of necessary plant. In gravel, clay, sand, chalk, or other soft strata, not exceeding

100	feet	from	surface,	from	8*s.* to 20*s.*	per foot.
200	„	„	„	13*s.*	„ 30*s.*	„
300	„	„	„	18*s.*	„ 40*s.*	„
400	„	„	„	23*s.*	„ 50*s.*	„
500	„	„	„	28*s.*	„ 60*s.*	„

NOTES OF PRICES FOR ELECTRIC WORK.

THE cost of fitting up electric cables and wires for houses in towns where supplied from central stations varies, according to the number and the distribution of the lights, from 25*s.* to 35*s.* per 16 candle-power lamp. This price should include all the necessary casings, and also switches and safety fuses. The lamps will be extra, about 4*s.* each, and the fittings for carrying the lamps are, of course, not included.

For country houses, or places where the current is to be produced on the premises, the cost of fitting up the necessary machinery, including engines and dynamos, &c., may be taken at about 50*s.* to 60*s.* per 16 candle-power lamp, whilst if an accumulator be added for supplying a portion of the lights when engines are not working, the cost of such accumulator, including the various fittings requisite, will be about 4*l.* per 16 candle-power lamp.

The following may be taken as a sample of the cost for a country house requiring 200 lights:—

	£	*s.*	*d.*
Wiring, switches, and fuses	350	0	0
Machinery	500	0	0
Accumulator and fittings for 100 lights ..	400	0	0
Total	£1250	0	0

If the machinery is placed far from the house, some extra allowance must be made for main cable.

It is of great importance that all electrical work should be of the best quality, and carried out by experienced tradesmen.

RULES AND REGULATIONS, BY THE SOCIETY OF TELEGRAPH-ENGINEERS AND ELECTRICIANS, FOR THE PREVENTION OF FIRE RISKS ARISING FROM ELECTRIC LIGHTING.

These General Rules are drawn up with the object of reducing to a minimum, in the case of the electric light, those risks of fire which are inherent in every system of artificial illumination, and also for the guidance of those who possess, and those who contemplate having, electric lighting apparatus on their premises.

It is to be understood that these General Rules are not intended to supersede any Detailed Rules which Fire Offices may issue for their own protection.

It would therefore be desirable that before the electric light is used, notice should be sent to the Fire Office in which the building is insured, in order that an opportunity may be given for inspecting the installation.

The chief difficulties which beset the electrical engineer are internal and invisible, and they can only be effectually guarded against by testing with special apparatus and electric currents; they arise from leakage and from bad connections and joints, which lead to waste of energy and the production of heat to a dangerous extent.

In addition, the difficulties arising out of defective and inefficient apparatus are numerous; they must be understood and guarded against.

The necessity cannot be too strongly urged for guarding against the presence of moisture, which leads to loss of current and to the destruction of the conductors and apparatus by corrosion and otherwise.

Injudicious connections of any part of the circuit with the "earth" tend to magnify every other source of difficulty and danger.

Many of the dangers in the application of electricity arise from ignorance and inexperience on the part of those who supply and fit up inadequate plant, and frequently from injudicious economy on the part of the user.

The greatest element of safety is, therefore, the employment of skilled and experienced electrical engineers to specify the method

in which the work is to be done, and the quality of the materials to be employed, and to supervise the execution of the work.

Conductors.

1. They must have a sectional area and conductivity so proportioned to the work they have to do that, if double the current proposed is sent through them, the temperature of such conductors shall not exceed 150° F.

2. The conductors, or their casings, should be placed in sight, if possible; and they should always be as accessible as circumstances will permit.

3. Within buildings they should all be insulated; and this rule applies equally to all conductors and parts of fittings which may have to be handled.

4. Whatever insulating material is employed, it should not soften until a temperature of 170° F. has been reached, and in all cases the material must be damp-proof.

5. When leads pass through roofs, floors, walls, or partitions, and where they cross or are liable to touch metallic substances, such as bell wires, iron girders, or pipes, they should be thoroughly protected by suitable additional covering; and where they are liable to abrasion from any cause, or to the depredations of rats or mice, they should be encased in some suitable hard material.

6. In the case of portable fittings with which flexible leads are used, special precautions must be taken.

7. Conductors should be kept as far apart as circumstances will permit, the spacing between them being governed by their potential difference.

8. When conductors are carried in very inflammable structures, precautions should be taken to isolate them therefrom.

9. Conductors which are protected on the outside by lead, or metallic armour of any kind, require the greatest care in fixing, on account of the large conducting surface which would become connected to the core in the event of metallic contact between them.

10. In cases where conductors pass into a building, from one building to another, or from one room to another, precautions should be taken to prevent the possibility of fire or water passing along the course of the conductors.

11. All joints must be mechanically and electrically perfect, to

prevent heat being generated at these points. When soldering fluids are used in making joints, the latter should be carefully washed and dried before insulation is applied.

12. Under all circumstances complete metallic circuits must be employed. Gas and water pipes must never form part of the circuit, as their joints are rarely electrically good, and therefore become a source of danger.

13. Overhead conductors, whether passing over or attached to buildings, must be insulated at their points of support. Precautions must be taken to obviate all risk of short-circuiting where they are likely to touch a building or other overhead conductors and wires, either by their own falling or by being fallen upon by other conductors.

14. In the case of overhead wires, every main should have a lightning protector at each point where it enters or branches into a building.

15. Metal fastenings for fixing conductors should be avoided; but, when unavoidable, some additional covering should protect the conductor from mechanical injury at such fixing points.

16. The insulation of a system of distribution should be such that the greatest leakage from any conductor to earth (and, in case of parallel working, from one conductor to the other, when all branches are switched on, but the lamps, motors, &c., removed) does not exceed one five-thousandth part of the total current intended for the supply of the said lamps, motors, &c., the test being made at the usual working electromotive force.

17. It will often be found a great convenience and assistance in the prevention of accidents if the positive lead be coloured differently to the negative, or made otherwise distinguishable.

Switches.

18. Every switch or commutator should be of such construction as to comply with the following condition, namely—That when the handle is moved or turned to and from the positions of "on" and "off," it is impossible for it to remain in any intermediate position, or to permit of a permanent arc, or heating.

19. The handles of every switch must be completely insulated from the circuit.

20. The main switches of a building should be placed as near

as possible to the point of entrance of the conductors, or to the generators of the current if they are within the building itself. Switches should be provided on both leads.

21. Switch-boards should bear clear instructions for their use by the inexperienced.

Electrical Fittings Generally.

22. Switches, commutators, resistances, bare connections, lamps, &c., must be mounted on incombustible bases. Cut-outs mounted on bases of wood rendered uninflammable are admissible. Vulcanite bases are undesirable in damp situations. The cracking of porcelain and earthenware fittings is a source of danger which can be avoided by precautions in fixing.

Cut-outs.

23. All circuits should be protected with cut-outs; and all leads from the mains, or small conductors from larger ones, must be fitted with cut-outs at their branching points.

24. Where fusible cut-outs are used, the section should be so situated within its frame that the fused metal cannot fall where it may cause a "short-circuit" or an ignition.

25. For all main conductors a cut-out should be provided for both the "flow" and "return," and the two fusible sections must not be in the same compartment.

26. The flexible leads of portable fittings must in all cases be protected by cut-outs at their fixed points of connection.

Arc Lamps.

27. Arc lamps must always be guarded by lanterns or netted globes, so as to prevent danger from ascending sparks and from falling glass and incandescent pieces of carbon.

28. All parts of the lamps and lanterns which are liable to be handled (except by the persons employed to trim them) should be insulated.

The Dynamo.

29. The armatures and field-magnet coils should be thoroughly insulated. Dynamos should always be fixed in dry places, and

they must not be exposed to dust flyings or other industrial waste products carried in suspension in the air. They should not be permitted in the working-rooms of mills, where the liability to such dangers exists, or where any inflammable manufactures are carried on or inflammable materials are stored.

30. Motors should be subject to the same conditions; but when it is necessary to use them in positions such as those above referred to, they must be securely cased in, such cases having a non-combustible lining.

Batteries.

31. Both primary and secondary batteries should be placed and used under the same precautions as prescribed for dynamos; and the room in which they are placed should be well ventilated. The batteries themselves must be well insulated.

Transformers.

32. When these are used to transform either direct or alternating currents of high electro-motive force—that is, from or to an electro-motive force of, say, 200 volts—they, together with their switches and cut-outs, must be placed in a fire- and moisture-proof structure —preferably outside the building for which they are required. No part of such apparatus should be accessible except to the person in charge of their maintenance.

33. In all cases conductors conveying currents of high electro-motive force inside buildings must be specially and exceptionally insulated, cased in, and the casing made fire-proof.

34. The positive and negative terminals connected to such conductors should not be permitted to be nearer each other than 12 inches.

35. Transformers which, under normal conditions of load, heat above 150° F., should not be permitted to remain in use.

36. Transformers should be so constructed that under no circumstances whatever should a contact between the primary and secondary coils lead the high E.M.F. into the building.

Maintenance.

37. The value of frequently testing and inspecting the apparatus and circuits cannot be too strongly urged as a precaution

against fire. Records should be kept of all tests, so that any gradual deterioration of the system may be detected.

38. Cleanliness of all parts of the apparatus and fittings is essential to good maintenance.

39. No repair or alterations must be made when the current is "on."

All the above rules, for the reduction to a minimum of the risks from fire, are also applicable in principle to installations of electricity for other uses than that of lighting; they also include precautions necessary to avoid risk of injury to persons, whether the conductors and apparatus are situated inside or outside a building.

By Order of the Council.

F. H. WEBB, *Secretary.*

Offices of the Society,
4, The Sanctuary, Westminster,
April, 1888.

EXAMPLES OF ELECTRIC LIGHTING WORK CARRIED OUT BY THE AUTHOR.

ELECTRIC LIGHTING OF A COUNTRY HOUSE.

Specification of Electric Lighting Works at ——— House.

GENERAL CONDITIONS.

1. The entire installation of boilers, engines, dynamos and accumulators, &c., with all wiring throughout the building, will be completed and tested with light running, and to be approved and passed by the electrician appointed by (————) within four months of the date of the acceptance of tender, and a penalty of 5*l.* per day will be exacted for each day's delay beyond this time.

2. A test run of six consecutive hours under full load will be required to show that the entire plant is thoroughly capable of the work, and the contractor will run and keep the entire installation in working order at his own cost for a period of one calendar

month, and train a workman in the management and charging of the accumulator cells. The contractor will also agree to guarantee the satisfactory working of the entire installation, as far as workmanship and materials are concerned, for a term of one year from the date of its being taken over by (————) and for this purpose 10 per cent. of the contract price will be withheld until this time expires for the purpose of ensuring the making good of any defects which may occur.

3. On the acceptance of tender or part of tender, the contractor will submit plans of the arrangement of boilers, engines, and dynamos, &c., with all brickwork and flues, accumulators, main automatic cut-outs and switch-board, with routes for leading wires, &c., and plans of foundations, which are to be submitted to the architect for his approval and written sanction before being proceeded with.

4. The building work required will be provided for the contractor, but the contractor shall be bound at his own cost to repair and make good any damage done by his men employed on the work, or resulting from the execution of this contract, and all such repairs must be carried out to the satisfaction of the architect or his representative.

5. The contractor will enter into a formal contract (at joint expense), and if required, will find security for the due fulfilment of the contract.

Boilers.—Two best make *steel* locomotive multitubular boilers capable of supplying steam with easy firing for 20 H.P. nominal each, with a working pressure of 120 lb. on the square inch, to be supplied and fixed complete, with all necessary fittings, such as gauge glasses, gauge cocks, pressure gauges, double safety valves, stop valves, blow-off cocks, injectors, feed pumps, &c. The boiler and steam pipes to be thoroughly well lagged with non-conducting material, and the boilers covered with best 20 W.G. sheet iron, Swedish or charcoal brand.

The furnace to be fitted with special smoke consuming arch, and special fire door for same.

Engines.—Two 20 H.P. (nominal) compound condensing engines of the horizontal type by "Robey," or "Paxman," or other approved maker, to be supplied and fixed complete, with heavy flywheel

6 ft. diameter and 11 in. broad, turned on face to receive driving belt, and to be fitted with automatic expansion and sensitive governor suited for electric light driving, and capable of being adjusted whilst running. All the parts of engine to have broad moving surfaces, and fitted with efficient lubricators for long runs. The condenser to be fitted complete, with air pumps and attachments to the low-pressure cylinder.

NOTE.—An alternative price is given for supplying the engines non-compound and without condenser, in which case the engines would be double-cylinder engines, working at a pressure of 70 lb. per square inch, and the boilers would be provided for working at the same pressure.

Dynamos.—Two shunt-wound dynamos of the best make, by "Edison Hopkinsons," "Elwell Parker," or other approved make, to be provided and fixed complete, capable of supplying current, if required, to 200 16-candle lamps, at a pressure not exceeding 100 volts, and *at a speed not exceeding 750 revolutions per minute.* A switch board and variable resistance to be attached to each dynamo, so that the pressure may be changed (for charging the accumulators) up to 135 volts, or lowered to take the duty of 400 lamps running direct, without any sparking at the brushes. The dynamos to be carefully insulated from earth, and fitted with sliding bed and screw adjustment to tighten belt whilst running. The insulation resistance between the framework and coils to have careful attention, and every precaution to be taken to make the insulation of coils quite impervious to damp and oil.

Storage Cells.—A battery of E.P.S. accumulators to be supplied and installed complete, fitted on insulators consisting of 55 31-plate cells, capable of running, say 100 16-candle power 105 volt lamps for a period of ten hours. The cells to be arranged so that the E.M.F. of each or any cell can be read from voltmeter to be fixed for this purpose in engine room.

Switch Board and Testing Apparatus.—A main switch board to be fitted in dynamo room, with strong double self-cleaning scraping contact switch, and each circuit guarded by a sensitive automatic cut-out to act when the current passing rises to 20 per cent. above the normal load. A neat testing board, to be supplied and fitted

up in dynamo room with three constant reading ammeters, and one Cardew voltmeter coupled to terminals of dynamo, also one Cardew voltmeter for storage cells, as already mentioned.

Water Supply to be laid on to the engine room for the contractor, ready for him to attach his pipes and fittings to, for feed water, &c., condensing and overflow for waste water to be also provided.

Main Cables.—The main cables to consist of 37 strands No. 12 B.W.G. copper, insulated and drawn into lead pipe protected on outside with steel armour, and laid underground from engine room to mansion. The mains to terminate inside mansion, where distributing boards will be fixed with double pole cut-outs.

Wires, &c., in Mansion.—All the wires and cables to be of the highest quality of insulation, and the current passing in any circuit not to exceed 1000 ampères per square inch of sectional area, and the conductor to be of not less than 96 per cent. of the conductivity of pure copper.

The dielectric to be of the best vulcanised indiarubber, with a guaranteed insulation resistance equal to 300 *megohms* per mile. All contact with iron beams, water and gas pipes, to be carefully avoided. The existing metal tubes which are already laid will not be used, as this is contrary to the Insurance Company's rules, but in many cases these tubes can be withdrawn and their place taken by the proper wood casing.

A distributing board will be fixed at the light hole for the kitchen wing. A second board to be fitted on the second floor for the centre block, and a third to be fitted to serve the grand staircase wing, with all suitable safety fuses, &c. The wires to be fitted to supply the 605 lights mentioned in the accompanying list of lights, in such positions as may be settled by the architect or his representative, and the number may be reduced or increased, as may be desired, any difference being calculated in the cost, adding or deducting pro rata.

Switches.—Each part or room to be fitted with cut-out switches of approved pattern, placed in accessible positions near entrance door to each department or room, and mounted on slate bases.

Lamps.—To be of Edison Swan, best make, of 16 candle-power each, securely held in best socket holders.

Phœnix Fire Office Rules.—The whole of the work to be carried out to comply with the Phœnix Fire Office Rules.

Steam Supply.—A connection to be left on boiler for steam supply to main buildings.

NOTE.—The insulation of the cables and wires in mansion has been provided for 300 megohms per mile, as this is the lowest make of wire that is usually supplied in *vulcanised* indiarubber. This is in place of the 100 megohms per 1000 yards as specified in terms of contract, and is nearly double this insulation, and we should recommend its being used, although it increases the cost considerably.

ESTIMATE FOR THE WORK.

	£
Boilers and fittings complete	595
Engines	780
Dynamos	540
Storage cells	340
Switch-board and testing apparatus	60
Wiring, switches, &c.	880
Main cables underground	115
Lamps and holders	166
Total	£3476

Specification and Estimate for an Electric Wiring Installation to be Carried out at ——— House, London, Supplied by the Chelsea Electricity Supply Company.

Cables and Wires.—Supply and fix all the necessary copper branch cables and wires as required for the installation.

Main Distribution Board.—The cables to start from a suitable main distribution board placed in basement, to be made of either polished teak or mahogany, complete with patent safety fuses, and left ready to receive the main cables.

Main Cables and Main Switch.—To be provided and fixed where necessary.

Conductivity.—The specific conductivity of the conductors to be not less than 96 per cent. of pure copper.

Carrying Capacity.—The sectional area of the conductors to be so proportioned that the current they carry shall in no case exceed 1000 ampères per square inch of copper.

Insulation.—All cables and wires to have an insulation resistance of 300 megohms per statute mile at 60° Fahr.

Joints.—All joints, where necessary, to be properly made, scarfed, soldered, and carefully insulated with rubber compound, and wrapped with waterproof tape.

Circuits.—The arrangement of the conductors to be on the multiple circuit system, i.e. the installation to be divided into small circuits carrying not more than 5 ampères of current.

Distribution Board.—The different circuits to be grouped on to a suitable distribution board, made either of polished mahogany or teak.

Cut-out Blocks and Safety-fuses.—Each of the circuits to be protected by patent double polar safety blocks and fuses, the blocks manufactured in white porcelain, highly glazed, the safety-fuses to be so proportioned as to melt with an excess of current of not more than 25 per cent. above that for which they are intended.

Positions.—The wires to be brought to the various positions as pointed out in the schedule, and left ready to connect to (but exclusive of wiring) the various electroliers, brackets, &c.

Wood Casings.—All conductors, where possible, to be enclosed in substantial American white wood casing, the positives and negatives to be placed in separate grooves with a width of wood of not less than half an inch between them.

Switches.—Provide and fix the necessary switches, for controlling the light, that may be required.

Lamp Sockets.—Provide the necessary lamp sockets.

Incandescent Lamps.—Provide the necessary lamps of Edison Swan or other approved manufacture.

Generally.—All necessary superintendence, including carriage of goods, to be provided, and the whole work to be carried out in a first-class manner, inclusive of cutting away and making good, and exclusive of painting casings, &c.

Insurance.—The installation, when completed, to be approved by the Fire Insurance Company in which the building is insured.

The whole of the Electric Lighting Works specified to be left in complete working order to the satisfaction of (——), his architect, or any electrician to be agreed upon by both parties, for testing the same.

Mains, Sub-mains, and Leads.—Generally throughout, the cross sections of the sub-mains and branches will be of an area not less than the mean between the cross sections of the main to which they are attached, and half the sum of the cross sections of the leads of the lamps they are intended to serve, and no lead to a single lamp is to be less in cross section than a No. 18 S. W. G., and no lead to floor connections will be less in cross section than No. 16 S. W. G.

Insulation Resistance.—Main cables to have an insulation resistance of not less than 300 megohms per mile.

Sub-mains of less cross section than 7/20 S. W. G., and leads, will have an insulation resistance of not less than 300 megohms per mile, the insulating materials in all cases to be vulcanised.

In Casing —All mains and sub-mains will be placed in approved wood casing, and in no case will a pair of mains be carried through the same hole or tube or where their coverings can be in contact.

Casings to be Varnished.—All wooden casing when covered in with plaster will be coated inside and out with shellac varnish ; when laid on the surface of the wall it will be varnished inside only.

Lamp Leads.—When the lamp leads serve lamps in rooms with wainscoting or ornamental walls, where casing is not suitable, they will be led separately and by different routes to the point where the lamps are fixed, they will be secured with saddles, and will in no case, except where casing is used, approach nearer than within 2 in. of each other.

Under Floor.—Where carried between floor and ceiling, they will be laid between the joists or in notches cut in the same, not less than 6 in. apart (the notches to be in depth twice the thickness of the cable), and in no case will any pair of leads be carried between the same joists. They will be coloured throughout—positive red, negative black.

Wherever (between floor and ceiling) branches leave the main, they will be laid with sufficient slack, so that the branches shall not approach nearer to the main of the opposite pole than 6 in., the necessary cleats being attached to, and holes bored in the joists to secure that end.

The boards under which they immediately pass to be screwed down, and when there is a point at which two or more joints are made, access must be made in the floor over such joints.

Wall Blocks.—A wooden wall block will be driven into the wall and fixed at every point where a lamp, wall plug, switch, or cut-out, is specified to be fixed under the contract, except where panelling or stone ornament already exists, when special means of attaching the fitting will be arranged for.

Switches.—In every room, vestibule, or closet, throughout the premises, one light will be separately controlled by a switch at the door, placed so as to be of easy access to the hand immediately the door is opened. When a switch is specified to be placed outside the door, it will be fixed on the same side of the opening as the door handle.

Main Distribution Boards.—Main distribution boards will be supplied and fixed where required. Each circuit will be furnished with a switch and double pole cut-out. In cases in which no double pole switch is used on the service main these switches will be *double pole.* Separate circuits will be indicated in legible characters on permanent labels to be attached to the boards.

Cut-outs.—Cut-outs will be fixed at any other point in the system than those on the distribution boards, at or near main junctions, and in or alongside the switches.

Ceiling Connections.—Ceiling roses or bosses of improved construction will be used. Where possible they will be screwed through the ceiling to a joist, and where a joist does not exist over the point where the connection is to be placed, a stretcher will be fixed between the joists.

Plugs, Wall, and Floor.—In the case of floor connections, the plugs will make connection through a plate of ebonite laid flush with the floor, and the points will not be less than 2 inches apart. The sockets will be open at the base, so that dust will fall through into a cavity below.

Cost of Electric Lighting at a Bank in London, with Accumulators.

The cost of a complete electric installation, including fittings for 320 incandescent lamps of 16 candle-power each, which has been working for about two years at one of the Banks in London, and is driven by Otto Crossley gas engines:—

Number of incandescent lamps, 320 of 16 candle-power.

	£	s.	d.
Capital expended	3000	0	0

Cost of Plant.

	£	s.	d.
Two 9 horse-power Otto gas engines and fixing ..	650	0	0
Two dynamos	300	0	0
Two sets of accumulators	1250	0	0
Fitting up the bank throughout with wire, lamps, and all accessories, and architect's charges	800	0	0
	£3000	0	0

Working Expenses.

This building being very dark the lamps have very long hours, say 1800 per annum.

	£	s.	d.
Gas used, 2,000,000 cubic feet at 2*s.* 6*d.* per 1000 ..	222	0	0
Proportion of wages of attendant, who does other work	75	0	0
Oil, waste, and water	25	0	0
Repairs to engines and dynamos, and depreciation, 10 per cent.	95	0	0
Repairs to accumulators, and depreciation, 15 per cent.	187	10	0
Cost of renewals of incandescent lamps (each burning 1000 hours at 3*s.* 9*d.* each)	108	0	0
	712	10	0
Interest on capital at 10 per cent.	300	0	0
	£1012	10	0

Current of electricity supplied, about 35,500 Board of Trade units.

If we analyse the above figures we shall find that :—

	d.
The cost of generating electricity, including wear and tear and interest on capital, is per Board of Trade unit	5·58
Interest on fittings, per Board of Trade unit	·56
Cost for renewal of lamps, per Board of Trade unit	·70
The total cost per Board of Trade unit on the complete installation	6·84

From these figures it will be seen that if the bank had obtained electricity from a Central Station Electric Lighting Company, at 8*d.* per unit, the total cost to them would have been :—

	d.
Electricity, per Board of Trade unit	8·00
Interest on fittings, per Board of Trade unit	·56
Cost for renewal of lamps, per Board of Trade unit	·70
Total per Board of Trade unit	9·26

Central Station Lighting.

For lighting from central stations the electricity may be supplied in either of the four following methods, according to the situation and requirements of the district.

(*a*) By direct current distribution on a two-wire system.
(*b*) By direct current distribution on a three-wire system.
(*c*) By direct current distribution on a battery and transformer system.
(*d*) By alternating current distribution on a transformer system.

The selection of either of these systems depends entirely upon local conditions, and no particular one is best under all circumstances. The area over which the current is distributed is the chief factor which determines the choice. Speaking generally, the first method is the best for distribution over a small area, while for a more extended area the advantage lies with the second system. With either of these, storage, by means of secondary batteries, may be employed. For still more extended areas the third or fourth system is adopted.

ELECTRIC LIGHT SWITCHES.

		£	s.	d.
Porcelain Double-Break Spring Switch.—No. 1, for currents up to 5 amperes	each	0	2	6
Porcelain Double-Break Spring Switch.—No. 2, for currents up to 15 amperes	„	0	3	6
Phœnix Spring Switch.—Slate base, Brass Cover; for Single Lamps, 2s. 2d. each ..	per doz.	1	4	0
Admiralty Pattern Switch for key	each	0	7	0
Keys for same ..	„	0	0	8
Accumulator Switch, five-way on Slate	.. ..	3	10	0
Double-Pole Spring Switch.—To carry 25 amperes	.. ..	2	0	0
Double-Pole Spring Switch.—To carry 50 amperes..	.. ..	2	10	0
Double-Pole Spring Switch.—To carry 100 amperes..	.. ..	3	0	0
Double-Pole Spring Switch.—To carry 250 amperes..	.. ..	3	10	0
Keys for same, with insulated handles	each	0	5	0
Fuse Holders on Slate, for Large currents, up to 50 amperes..	„	0	7	6
Fuse Holders on Slate, for Large currents, up to 100 amperes	„	0	15	0
Fuse Holders on Slate, for Large currents, up to 200 amperes	„	1	5	0
Fuse Holders on Slate, for wire Fuses, with tags to solder leads into, up to 50 amperes	„	0	3	6
Fuse Holders on Slate, for wire Fuses, with tags to solder leads into, up to 100 amperes	„	0	5	6
Fuse Holders, for single lamps or small groups, up to 5 amperes, porcelain bases and covers	„	0	1	6
Fuse Holders, for single lamps or small groups, up to 10 amperes, porcelain bases and covers	„	0	2	0
Fuses, up to 10 amperes	per 100	0	12	0
Beyond 10 amperes to 50 amperes ..	per doz.	0	4	0
Beyond 50	„	0	6	0
Automatic Cut-Out for Accumulators	each	1	5	0
Lamp Holders, Brass Socket, with bayonet joint and spring contacts, inside connection, without lamp	„	0	1	6

Size. B.W.G.	Ohms per 1000 yds. at 65.	Weight per mile in pounds.	Absolute safe working current.	Price per yard. A quality.	Price per yard. B quality.
				s. *d.*	*s.* *d.*
22	41·616	12	1	0 1¼	0 1½
18	14·168	37	3	0 1¾	0 2½
14	5·098	102	10	0 3	0 4½
12	3·016	173	17	0 4½	0 6
10	1·991	262	26	0 6	0 7

A Quality is suitable for general use, under cover in dry or damp atmospheres.

B Quality—Copper strands, insulated with vulcanized india-rubber, suitable for wet situations or high tension currents, insulation resistance 1000 megohms per mile.

Incandescence Lamp Fittings.

Prices—Brass, Polished and Lacquered.

No.	Bracket.	Shade Holder.	Lamp.
	s. *d.*	*s.* *d.*	*s.* *d.*
1	16 6	1 0	0 9
2	8 6	1 0	0 9
3	8 0	1 0	0 9
4	12 6	1 0	0 9
5	9 0	1 0	0 9
6	10 6	1 3	0 9
7	9 0	1 0	0 9
8	10 6	1 0	0 9
9	10 6	1 0	0 9
10	14 6	1 0	0 9
11	16 0	1 0	0 9
12	12 0	1 0	0 9
13	26 0	1 0	0 9

Plain Opal Shades, 1*s.* 3*d.* Globes, from 2*s.* 3*d.* Conical, from 1*s.* 6*d.* Wall Plates, in Mahogany or Oak, 1*s.* 2*d.* Oblong, from 1*s.* 8*d.*

COLOURED BULBS (Edison and Swan United Electric Light Co., Lim.).

No. 1 and No. 2 sizes.

Dark Ruby (for photographic purposes) ..	Price 2s. 6d. per lamp extra.
Ruby	
Ruby, Iced	Price 3s. 9d. per lamp extra.
Pale Pink	Price 1s. per lamp extra. Most of these can be had in iced glass at 3s. extra.
Dark „	
Sage Green	
Peacock Green	
Dark „	
Ultramarine Blue	
Azure „	
Pale Amber	
Dark „	
Smoked Amber	
Straw Opalescent	
Turquoise	Price 1s. 6d. per lamp extra.
Transparent Opal	
Dead „	
Lavender „	
Gold „	
Green „	
Cream „	
Azure Blue „	
Orange „	Price 2s. per lamp extra.

Any of the above diamond marked and circular ribbed bulbs 6d. per lamp extra.

Bulbs Nos. 4, 5, and 6, half the above prices.

Opal striped with Ruby..	Price 2s. 6d. per lamp extra.
„ „ Blue	
„ „ Green	
Flint „ Opal	
„ Circular, striped with Opal..	
„ Variegated „	
Lamps obscured (ordinarily)..	Price 3d. extra.
„ „ fancy patterns	„ on application.
„ varnished in colours	„ 3d. extra.
„ silvered..	„ from 1s. 3d. extra.

LAMPS.

300 & 400 candle-power (50 to 110 volts). 500 & 600 candle-power (65 to 110 volts).

300 candle-power	12s. 6d.
400 „	15s.
500 „	17s. 6d.
600 „	20s.

800, 1000, and 1200 candle-power (80 to 110 volts). 1500 and 2000 candle-power (100 to 110 volts).

800 candle power	25s.
1000 „	30s.
1200 „	35s. 6d.
1500 „	39s.
2000 „	42s.

Electric Bells.

		£	s.	d.
2½ in. Trembling (Admiralty quality)	each	0	7	0
3 " " " "	"	0	8	0
3½ " " " "	"	0	9	0
4 " " " "	"	0	11	0
2½ " " (Second quality)	"	0	4	6
3 " " "	"	0	5	0
3½ " " "	"	0	6	0
4 " " "	"	0	7	6
"◊" Bell on Iron Frame, Special quality and price	"	0	3	0
" " Set complete, with battery, wire, &c.	"	0	10	6
Portable Bell Sets, complete in case .. each 13*s.*, 16*s.*, and		1	0	0
"Jensen" Church Shape Bells, each, 8*s.* 6*d.*, 9*s.* 6*d.*, 10*s.* 6*d.*, 12*s.*, 13*s.*, 14*s.*	"	0	15	0
"Wholesale" Jensen Bell Set, complete with batteries, wire, staples, &c.	each	0	12	6

Indicators.

Mechanical Throwback, first quality, above 10 numbers, per hole		0	10	0
" " second " " 12 " "		0	5	0
" " third " " 12 " "		0	4	0
Electrical " standard " " 6 " "		0	6	6

Pushes, Pulls, &c.

2½ in. Pushes in boxwood	per doz.	0	7	6
2½ " " " mahogany, cocus, &c.	"	0	10	6
3 " " " "	"	0	15	0
3 " " " " " pear-shaped	"	0	14	0
3 " " " china, plain	"	0	8	6
3 " " " " gold lines	"	0	13	0
Fancy patterns in china and marble, extra.				
3 in. Pushes, in metal	from, each	0	4	6
Pushes (outdoor) from	" "	0	1	3
Bell Pulls (outdoor)	" "	0	5	0
Burglar Alarms	" doz.	1	1	0
Floor Contacts	" each	0	3	6
Lincrusta Walton Pushes	" doz.	0	8	6
Fire Alarms	" each	0	7	6
Bedhead Pulls	" "	0	2	9
Electric Gas Lights "Automatic"	" "	0	3	6
"Matchless" Electric Gas Lighter	" "	0	10	6

Batteries.

Leclanché, porous pot form, each, No. 1		0	2	3
" " " No. 2		0	1	4
" " " No. 3		0	1	1
" agglomerate, " No. 1		0	2	11
" " " No. 2		0	2	2
" " " No. 3		0	1	9
Sal Ammoniac (fluctuating)	per lb.	0	0	6
Zinc Rod	per cwt.	2	0	0

Telephones.

No. 1. Domestic type, for fitting on electric bell circuits, per station		1	7	6
" 2. " complete with bell, &c.	"	1	17	6
" 3. " wall type "	"	1	17	6
" 4. " inkstand type "	"	2	17	6

	£	s.	d.
No. 5. Long distance type, Desk shape .. .. per station ..	4	17	6
„ 7. „ „ Table „ .. .. „ ..	5	7	6
„ 9. „ „ Compactum shape .. .. „ ..	2	5	0
„ 10. „ „ Thorough „ .. .. „ ..	3	18	0
„ 11. „ „ National „ .. .. „ ..	5	5	0
Line Wire for overhead use .. .. per lb. ..	0	1	0
Leading-in Wire .. .. „ yd. ..	0	0	2½
Indoor Bell and Telephone Wire .. .. from „ „ ..	0	0	0½
Staples . .. . „ lb. ..	0	1	0
„ driver .. .. each	0	1	6
Insulating Tape .. .. per lb. ..	0	5	0
Gutta-percha Tissue .. .. „ ..	0	11	6
Binding Wire, per ½ lb. bobbin	0	0	6
Insulators and Shackles at various prices.			

Dynamos.

Continuous Current, say for 15–16 c.p. lamps .. .. each	28	0	0
"Kingdon" Alternate „ 150 „ „ .. .. .. about „	120	0	0

Motors.

½ h.p. for lifts, &c. .. .. „	16	0	0

Accumulators or Storage Batteries.

E. P. S. type. Sizes various, prices from .. .. per cell	1	7	0
Electric Pumps for running from street mains .. .. .. from	25	0	
Switches ("◊" patent) slate or porcelain, single light to 10 lights .. „	0	2	6
„ "G" „ 10 lights to 20 lights .. .. .. „	0	3	6
„ "◊" „ 60 lights to 400 lights .. from 11s. 6d. to	2	10	0
„ "G" „ 60 lights to 1000 lights and upwards, from 14s. to	4	0	0
		and up.	
Cut-Outs Slate or Porcelain .. .. from each	0	1	3
Automatic Cut-Outs (Cunyngham Pattern) .. .. „ „	1	15	0
Wall Sockets for portable lamps .. .. „ „	0	2	0
Switchboards .. .. „ „	2	4	0
Arc Lamps. Indoor .. .. „ „	5	5	0
„ Outdoor .. .. „ „	9	0	0
Carbons for ditto .. .. from, per foot	0	0	2
Arc Lamp Iron Standards .. .. from £4 to	65	0	0
Incandescent Lamps .. .. up to 32 c.p. each	0	3	9
„ „ .. .. 50 „ „	0	6	0
„ „ .. .. 100 „ „	0	7	6
„ „ .. .. 200 „ „	0	18	0
Lamp holders .. .. from, each	0	1	0
Do. "Climax" .. .. „ „	0	1	6
Portable Hand Lamps .. .. each	2	10	0
Brackets, Electroliers, &c. .. .. from 1s. each to	50	0	0
Dioptric Shades .. .. each, 4 in. 1s. 3d., and 12 in.	0	7	6
Shades, Globes, &c. .. .. from, per doz., 8s. 6d. to	5	0	0
Telegraph Wire (fluctuating) .. .. from, per ton	12	0	0
Insulators .. .. „ each	0	0	6
Ammeters and Voltmeters (standard size) .. .. .. „ „	3	10	0
„ „ (small size) .. .. .. „ „	2	2	0
Electric Light Cables and Leads. Special rates.			
Brass Saddles for wire .. .. from, per gross	0	2	6
Casing .. .. from, per 100 ft.	0	2	2
Jointing Materials, Sundries, &c., as per Bell Fixer's List.			

Brackets, Electroliers, &c.

To suit requirements, from 1*s.* each.
Dioptric Shades, 4 in., 1*s.* 6*d.* each; 12 in., 9*s.* each.
Shades, Globes, &c., from, per doz., 7*s.* 6*d.*
Ammeters, best make, 3*l.* 10*s.* each.
Voltmeters, 4*l.* 4*s.* each.
Electric Light Cables and Leads, special rates.
Brass Saddles for running wires, from, per gross, 2*s.* 6*d.*
Casing, from, per 100 ft., 2*s.*
Jointing Materials, Sundries, &c., prices various.
Writing Tables for the pocket, each, 2*s* 6*d.*

Electric Light Cable Casings.

M'Gaw & Co.'s Prices.

No.	Width in Inches.	Size of Grooves.	Distance between Grooves.	Per 100 Feet run.	
				Redwood.	Whitewood.
				s. *d.*	*s.* *d.*
501	$1\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	5 0	7 3
502	$1\frac{1}{2}$	$\frac{1}{4}$	$\frac{9}{16}$	6 0	8 3
503	$1\frac{3}{4}$	$\frac{3}{8}$	$\frac{11}{16}$	7 0	12 6
504	$2\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10 2	16 0
505	$2\frac{3}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	12 6	18 6
506	$3\frac{1}{4}$	$\frac{3}{4}$	1	13 0	21 0
507	$3\frac{3}{4}$	$\frac{7}{8}$	$1\frac{1}{8}$	20 0	30 0
508	$4\frac{1}{4}$	1	$1\frac{3}{16}$	24 0	35 6
509	$4\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{1}{4}$	28 0	40 0
510	$5\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	32 0	42 0
511	$5\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	40 0	60 0

LIGHTNING CONDUCTORS.

RULES RECOMMENDED BY THE LIGHTNING ROD CONFERENCE.

Points.—The point of the upper terminal should not be sharp, not sharper than a cone of which the height is equal to the radius of its base; but, a foot lower down, a copper ring should be screwed and soldered on to the upper terminal, in which ring should be fixed three or four sharp copper points, each about 6 in. long. It is desirable that these points should be so platinized, gilded, or nickel-plated, as to resist oxidation.

Upper Terminals.—The number of conductors or points to be specified will depend upon the size of the building, the material of which it is constructed, and the comparative height of the several parts. No general rule can be given for this, but the architect may assume that the space protected is a cone having the point for its apex, and the base whose radius is equal to its height. He must, however, bear in mind that even an ordinary chimney stack, when exposed, should be protected by short terminals connected to the nearest rod, inasmuch as accidents often occur owing to the good conducting power of the heated air and soot in a chimney.

Insulators.—The rod is not to be kept from the building by glass or other insulators, but attached to it by fastenings of the same metal as itself.

Fixing.—Rods should preferentially be taken down the side of the building which is most exposed to rain. They should be firmly held, but the holdfasts should not be driven in so tightly as to pinch the rod, or prevent the contraction and expansion produced by changes of temperature.

Factory Chimneys.—These should have a copper band round the top, and copper points each about 1 ft. long, at intervals of 2 or 3 ft. throughout the circumference, and the rod should be connected with all bands and metallic masses in or near the chimney. Oxidation at the points must be carefully guarded against.

Ornamental Ironwork.—All vanes, finials, ridge ironwork, &c., should be connected with the conductor, and it is not absolutely necessary to use any other point than that afforded by such ornamental ironwork, *provided the connection be perfect, and the mass of ironwork*

considerable. As, however, there is risk of derangement through repairs, it is safer to have an independent upper terminal.

Material for Rod.—Copper, weighing not less than 6 ounces per running foot, and the conductivity of which is not less than 90 per cent. of that of pure copper.

Joints.—Although electricity of high tension will jump across bad joints, they diminish the efficacy of the conductor, therefore every joint, besides being well cleaned, screwed, scarfed, or riveted, should be thoroughly soldered.

Protection.—Copper rods to the height of 10 feet above the ground should be protected from injury and theft, by being enclosed in an iron pipe reaching some distance into the ground.

Curvature.—The rod should not be bent abruptly round sharp corners. In no case should the length of the rod between two points be more than half as long again as the straight line joining them. Where a string course or other projecting stonework will admit of it, the rod may be carried straight through, instead of round the projection. In such a case the hole should be large enough to allow the conductor to pass freely, and allow for expansion.

Extensive Masses of Metal.—As far as practicable it is desirable that the conductor be connected to extensive masses of metal, such as hot-water pipes, &c., both internal and external; *but it should be kept away from all soft metal pipes, and from internal gas pipes of every kind.* Church bells inside well-protected spires need not be connected.

Earth Connections.—It is essential that the lower extremity of the conductor be buried in permanently damp soil; hence proximity to rain-water pipes, and to drains, is desirable. It is a very good plan to make the conductor bifurcate close below the surface of the ground, and adopt two of the following methods for securing the escape of the lightning into the earth. Copper rope may be led to the nearest gas or water main (not to a lead pipe), and be soldered to it; or the rope may be soldered to a sheet of copper 3-feet × 3-feet and 1-16th inch thick, buried in permanently wet earth, and surrounded by cinders or coke; or many yards of the rope may be laid in a trench filled with coke, taking care that the surfaces of the copper are, as in the previous cases, not less than 18 square feet.

Inspection.—Before giving his final certificate, the architect should have the conductor satisfactorily examined and tested by a qualified person, as injury to it often occurs up to the latest period of the works from accidental causes, and often from the carelessness of workmen.

Collieries.—Undoubted evidence exists of the explosion of fire-damp in collieries through the sparks from atmospheric electricity being led into the mine by the wire ropes of the shaft, and the iron rails of the galleries. Hence the headgear of all shafts should be protected by proper lightning conductors.

The relative conductivity of the cheaper metals is given as follows :—

Lead, 1; tin, 1½; iron, 2; zinc, 4; copper, 12. Copper is, therefore, the best conducting material of all the ordinary metals. As it is not liable to corrosion, and is very durable, it may be recommended as the most suitable for an efficient lightning conductor.

Copper lightning conductors should be ropes ½ inch diameter, or bands 1½ inches wide and ⅛ inch thick. But the copper ropes are preferable, in all respects, to bands. Iron lightning conductors should be either solid rods 1 inch in diameter, or bands 2 inches wide and ⅛ inch thick.

APPENDIX.

WEIGHTS AND MEASURES ACT, 1878.

[41 & 42 VICT. CH. 49.]

Metric Equivalents of Imperial Weights and Measures.

18. The table in the Third Schedule to this Act shall be deemed to set forth the equivalents of imperial weights and measures and of the weights and measures therein expressed in terms of the metric system, and such table may be lawfully used for computing and expressing, in weights and measures, weights and measures of the metric system.

Use of Imperial Weights and Measures.

19. Every contract, bargain, sale, or dealing, made or had in the United Kingdom for any work, goods, wares or merchandise, or other thing which has been or is to be done, sold, delivered, carried, or agreed for by weight or measure, shall be deemed to be made and had according to one of the imperial weights or measures ascertained by this Act, or to some multiple or part thereof, and if not so made or had shall be void; and all tolls and duties charged or collected according to weight or measure shall be charged and collected according to one of the imperial weights or measures ascertained by this Act, or to some multiple or part thereof.

Such contract, bargain, sale, dealing, and collection of tolls and duties as is in this section mentioned is in this Act referred to under the term "trade."

No local or customary measures, nor the use of the heaped measure, shall be lawful.

Any person who sells by any denomination of weight or measure other than one of the imperial weights or measures, or some multiple or part thereof, shall be liable to a fine not exceeding forty shillings for every such sale.

20. All articles sold by weight shall be sold by avoirdupois weight; except that—

(1.) Gold and silver, and articles made thereof, including gold and silver thread, lace, or fringe, also platinum, diamonds, and other precious metals or stones, may be sold by the ounce troy or by any decimal parts of such ounce; and all contracts, bargains, sales, and dealings in relation thereto shall be deemed to be made and had by such weight, and when so made or had shall be valid; and

(2.) Drugs, when sold by retail, may be sold by apothecaries' weight.

Every person who acts in contravention of this section shall be liable to a fine not exceeding five pounds.

21. A contract or dealing shall not be invalid or open to objection on the ground that the weights or measures expressed or referred to therein are weights or measures of the metric system, or on the ground that decimal subdivisions of imperial weights and measures, whether metric or otherwise, are used in such contract or dealing.

22. Nothing in this Act shall prevent the sale, or subject a person to a fine under this Act for the sale, of an article in any vessel, where such vessel is not represented as containing any amount of imperial measure, nor subject a person to a fine under this Act for the possession of a vessel where it is shown that such vessel is not used nor intended for use as a measure.

23. Any person who prints, and any clerk of a market or other person who makes, any return, price list, price current, or any journal or other paper containing price list or price current, in which the denomination of weights and

measures quoted or referred to denotes or implies a greater or less weight or measure than is denoted or implied by the same denomination of the imperial weights and measures under this Act, shall be liable to a fine not exceeding ten shillings for every copy of every such return, price list, price current, journal, or other paper which he publishes.

24. Every person who uses or has in his possession for use for trade a weight or measure which is not of the denomination of some Board of Trade standard, shall be liable to a fine not exceeding five pounds, or in the case of a second offence ten pounds, and the weight or measure shall be liable to be forfeited.

METRIC EQUIVALENTS.

TABLE of the Values of the Principal Denominations of Measures and Weights on the Metric System expressed by means of Denominations of Imperial Measures and Weights, and of the Values of the Principal Denominations of Measures and Weights of the Imperial system expressed by means of Metric Weights and Measures.

MEASURES OF LENGTH.

Metric Denominations and Values.		Equivalents in Imperial Denominations.			
	Metres.	Miles.	Yards.	Feet.	Ins. Decimals.
Myriametre	10,000	6 or	376	0	11·9
			10,936	0	11·9
Kilometre	1,000		1,093	1	10·79
Hectometre	100		109	1	1·079
Dekametre	10		10	2	9·7079
Metre	1		1	0	3·3708
Decimetre	$\frac{1}{10}$				3·9371
Centimetre	$\frac{1}{100}$				0·3937
Millimetre	$\frac{1}{1000}$				0·0394

MEASURES OF SURFACE.

Metric Denominations and Values.		Equivalents in Imperial Denominations.		
	Square Metres.	Acres.	Square Yards.	Decimals.
Hectare, i. e. 100 Ares	10,000	2 or		2280·3326
			11,960	3326
Dekare, i. e. 10 Ares	1,000		1196	0333
Are	100		119	6033
Centiare, i. e. $\frac{1}{100}$ Are	1		1	1960

MEASURES OF CAPACITY.

Metric Denominations and Values.			Equivalents in Imperial Denominations.					
	Litres.	Cubic Metres.	Quarters.	Bushels.	Pecks.	Gallons.	Quarts.	Pints. Decimals.
Kilolitre, i. e.	1,000	1	3	3	2	0	0	0·77
Hectolitre,	100	$\frac{1}{10}$		2	3	0	0	0·077
Dekalitre,	10	$\frac{1}{100}$			1	0	0	1·6077
Litre	—	$\frac{1}{1000}$						1·76077
Decilitre,	$\frac{1}{10}$	$\frac{1}{10000}$						0·176077
Centilitre,	$\frac{1}{100}$	$\frac{1}{100000}$						0·0176077

WEIGHTS.

Metric Denominations and Values.		Equivalents in Imperial Denominations.					
	Grams.	Cwts.	Stones.	Pounds.	Ounces.	Drams.	Decimals.
Millier	1,000,000	19	5	6	9	15·04	
Quintal	100,000	1	7	10	7	6·304	
Myriagram	10,000		1	8	0	11·8304	
Kilogram	1,000			2	3	4·3830	
		(or 15432·3487 grs.)					
Hectogram	100					3	8·4383
Dekagram	10						5·6438
Gram	1						0·56438
Decigram	$\frac{1}{10}$						0·056438
Centigram	$\frac{1}{100}$						0·0056438
Milligram	$\frac{1}{1000}$						0·00056438

MEASURES OF LENGTH.

Imperial Measures.	Equivalents in Metric Measures.			
	Millimetre.	Decimetre.	Metre.	Kilometre.
Inch	=25·39954			
Foot or 12 inches	—	=3·04794	= 0·30479	
YARD, or 3 feet, or 36 inches	—	—	= 0·91438	
Fathom, or 2 yards, or 6 feet	—	—	= 1·82877	
Pole or 5½ yards	—	—	= 5·02911	
Chain, or 4 poles, or 22 yards	—	—	= 20·11644	
Furlong, 40 poles, or 220 yards	—	—	= 201·16437	=0·20116
Mile, 8 furlongs, or 1760 yards	—	—	=1,609·31493	=1·60931

MEASURES OF SURFACE.

Imperial Measures.	Equivalents in Metric Measures.			
	Sq. Decimetres.	Square Metres.	Ares.	Hectares.
Square inch	= 0·06451			
Square foot or 144 square inches	= 9·28997	= 0·092900		
Square yard, or 9 square feet, or 1296 square inches	=83·60971	= 0·836097		
Pole or perch, or 30¼ square yards	—	=25·291939		
Rood, or 40 perches, or 1210 square yards ..	—	—	=10·116776	
ACRE, or 4 roods, or 4840 square yards	—	—	—	= 0·40467
Square mile or 640 acres..	—	—	—	=258·98945

Measures of Capacity.

Imperial Measures.	Equivalents in Metric Measures.			
	Decilitres.	Litres.	Dekalitres.	Hectolitres.
Gill	= 1·41983	= 0·14198		
Pint or 4 gills	= 5·67932	= 0·56793		
Quart or 2 pints	—	= 1·13587		
Gallon or 4 quarts.. ..	—	= 4·54346		
Peck or 2 gallons	—	= 9·08692	= 0·90869	
Bushel, or 8 gallons, or 4 pecks	—	—	= 3·63477	
Quarter or 8 bushels ..	—	—	—	= 2·90781

Cubic Measure.

Imperial Measures.	Equivalents in Metric Measures.		
	Cubic Centimetres.	Cubic Decimetres.	Cubic Metres.
Cubic inch	16·38618		
Cubic foot or 1728 cubic inches	—	28·31531	
Cubic yard or 27 cubic feet..	—	—	0·76451

Weights.

Imperial Weights.	Equivalents in Metric Weights.			
	Grams.	Dekagrams.	Kilograms.	Millier or Metric Ton.
Grain	= 0·06479895			
Dram	= 1·77185			
Ounce, avoirdupois, or 16 drams, or 437·5 grains	= 28·34954	= 2·83495		
Pound, or 16 ounces, or 256 drams, or 7000 grains..	=453·59265	=45·35927	= 0·45359	
Hundredweight or 112 lbs.	—	—	= 50·80238	
Ton or 20 cwt.	—	—	=1016·04754	=1·01605
Ounce, troy, or 480 grains	= 31·103496	= 3·11035	—	—

Foreign Measures compared with English.

1 mètre	France, Belgium, Holland, Italy	= 3·2809	English feet.
1 vara	Portugal, Brazil	= 3·934	„ „
1 pik	Egyptian	= 2·515	„ „
1 yard	Spanish	= 2·738	„ „
1 foot	Austrian	= 1·037	„ „
1 foot	Prussia, Denmark, Norway	= 1·029	„ „
1 foot	Swedish	= 0·974	„ „

Nautical Measure.

Nautical mile.
1 = 6082·61 feet.
3 = 1 league.
60 = 20 leagues = 1 degree = 69·121 English miles.

Miscellaneous.

A cable's length	= 240 yards.
A geographical degree	= 69·121 English miles.
The old wine gallon	= 231 cubic inches.
„ ale gallon	= 281 „
A stone	= 14 lbs.
20 articles	= 1 score.
12 dozen	= 1 gross.
A cord of wood	= 128 cubic feet.
A faggot of steel	= 120 lbs.
A cask of blacklead	= 11¼ cwt.
Pig of ballast	= 56 lbs.
Truss of straw	= 36 lbs.
Truss of hay	= 56 lbs.
A load of hay or straw	= 36 trusses.
A ton of Portland cement	= 10 sacks or 6 casks.
A barrel of tar	= 25 gallons.
A ton of freight by measurement	= 40 cubic feet.

Decimal Equivalents of Inches, Feet, and Yards.

Fractions of an Inch.	Decims. of an Inch	Decims. of a Foot.
1/16	·0625 =	·00521
1/8	·125 =	·01041
3/16	·1875 =	·01562
1/4	·25 =	·02083
5/16	·3125 =	·02604
3/8	·375 =	·03125
7/16	·4375 =	·03646
1/2	·5 =	·04166
9/16	·5625 =	·04687
5/8	·625 =	·05208
11/16	·6875 =	·05729
3/4	·75 =	·06250
13/16	·8125 =	·06771
7/8	·875 =	·07292
15/16	·9375 =	·07812
1 inch	1·00 =	·08333

Inches.	Feet.	Yards.
1 =	·0833 =	·0278
2 =	·1660 =	·0555
3 =	·25 =	·0833
4 =	·3333 =	·1111
5 =	·4166 =	·1389
6 =	·5 =	·1667
7 =	·5833 =	·1944
8 =	·6666 =	·2222
9 =	·75 =	·25
10 =	·8333 =	·2778
11 =	·9166 =	·3055
12 =	1·000 =	·3333

Decimal Equivalents of Pounds and Ounces.

1/16 oz. = ·01562 of a pound.	4 oz. = ·25 of a pound.
1/8 „ = ·03125 „	8 „ = ·5 „
3/16 „ = ·046875 „	12 „ = ·75.
1 „ = ·0625 „	16 „ = 1·00.

Feet and Inches, and their Equivalent Links.

Links.	Ft.	Inches.	Links.	Ft.	Inches.	Links.	Ft.	Inches.
1	0	7·92	35	23	1·20	68	44	10·56
2	1	3·84	36	23	9·12	69	45	6·48
3	1	11·76	37	24	5·04	70	46	2·40
4	2	7·68	38	25	0·96	71	46	10·32
5	3	3·60	39	25	8·88	72	47	6·24
6	3	11·52	40	26	4·80	73	48	2·16
7	4	7·44	41	27	0·72	74	48	10·08
8	5	3·36	42	27	8·64	75	49	6·00
9	5	11·28	43	28	4·56	76	50	1·92
10	6	7·20	44	29	0·48	77	50	9·84
11	7	3·12	45	29	8·40	78	51	5·76
12	7	11·04	46	30	4·32	79	52	1·68
13	8	6·96	47	31	0·24	80	52	9·60
14	9	2·88	48	31	8·16	81	53	5·52
15	9	10·80	49	32	4·08	82	54	1·44
16	10	6·72	50	33	0·00	83	54	9·36
17	11	2·64	51	33	7·92	84	55	5·28
18	11	10·56	52	34	3·84	85	56	1·20
19	12	6·48	53	34	11·76	86	56	9·12
20	13	2·40	54	35	7·68	87	57	5·04
21	13	10·32	55	36	3·60	88	58	0·96
22	14	6·24	56	36	11·52	89	58	8·88
23	15	2·16	57	37	7·44	90	59	4·80
24	15	10·08	58	38	3·66	91	60	0·72
25	16	6·00	59	38	11·28	92	60	8·64
26	17	1·92	60	39	7·20	93	61	4·56
27	17	9·84	61	40	3·12	94	62	0·48
28	18	5·76	62	40	11·04	95	62	8·40
29	19	1·68	63	41	6·96	96	63	4·32
30	19	9·60	64	42	2·88	97	64	0·24
31	20	5·52	65	42	10·80	98	64	8·16
32	21	1·44	66	43	6·72	99	65	4·08
33	21	9·36	67	44	2·64	100	66	0·00
34	22	5·28						

Weight of Men and Animals (average).

A crowd of men closely packed = 84 lbs. per foot super.
A horse (light for riding) = 8 cwt.
A horse (cavalry) = 11 cwt.
A horse (strong for carting) = 14 cwt.
A sheep = ¼ cwt.
A pig = 1½ cwt.
A cow = (about) 6½ cwt.
An ox = 8 cwt.

EMPLOYERS' LIABILITY ACT, 1880.

1. Where after the commencement of this Act personal injury is caused to a workman—

(1.) By reason of any defect in the condition of the ways, works, machinery, or plant connected with or used in the business of the employer; or

(2.) By reason of the negligence of any person in the service of the employer who has any superintendence entrusted to him whilst in the exercise of such superintendence; or

(3.) By reason of the negligence of any person in the service of the employer to whose orders or directions the workman at the time of the injury was bound to conform, and did conform, where such injury resulted from his having so conformed; or

(4.) By reason of the act or omission of any person in the service of the employer done or made in obedience to the rules or byelaws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf; or

(5.) By reason of the negligence of any person in the service of the employer who has the charge or control of any signal, points, locomotive engine, or train upon a railway,

the workman, or in case the injury results in death, the legal personal representatives of the workman, and any persons entitled in case of death, shall have the same right of compensation and remedies against the employer as if the workman had not been a workman of nor in the service of the employer, nor engaged in his work.

2. A workman shall not be entitled under this Act to any right of compensation or remedy against the employer in any of the following cases; that is to say,

(1.) Under sub-section one of section one, unless the defect therein mentioned arose from, or had not been discovered or remedied owing to the negligence of the employer, or of some person in the service of the employer, and entrusted by him with the duty of seeing that the ways, works, machinery, or plant were in proper condition.

(2.) Under sub-section four of section one, unless the injury resulted from some impropriety or defect in the rules, byelaws, or instructions therein mentioned; provided that where a rule or byelaw has been approved or has been accepted as a proper rule or byelaw by one of Her Majesty's Principal Secretaries of State, or by the Board of Trade or any other department of the Government, under or by virtue of any Act of Parliament, it shall not be deemed for the purposes of this Act to be an improper or defective rule or byelaw.

(3.) In any case where the workman knew of the defect or negligence which caused his injury, and failed within a reasonable time to give, or cause to be given, information thereof to the employer or some person superior to himself in the service of the employer, unless he was aware that the employer or such superior already knew of the said defect or negligence.

3. The amount of compensation recoverable under this Act shall not exceed such sum as may be found to be equivalent to the estimated earnings, during the three years preceding the injury, of a person in the same grade employed during those

years in the like employment and in the district in which the workman is employed at the time of the injury.

4. An action for the recovery under this Act of compensation for an injury shall not be maintainable unless notice that injury has been sustained is given within six weeks, and the action is commenced within six months from the occurrence of the accident causing the injury, or, in case of death, within twelve months from the time of death: Provided always, that in case of death the want of such notice shall be no bar to the maintenance of such action if the judge shall be of opinion that there was reasonable excuse for such want of notice.

5. There shall be deducted from any compensation awarded to any workman, or representatives of a workman, or persons claiming by, under, or through a workman in respect of any cause of action arising under this Act, any penalty or part of a penalty which may have been paid in pursuance of any other Act of Parliament to such workman, representatives, or persons in respect of the same cause of action; and where an action has been brought under this Act by any workman, or the representatives of any workman, or any persons claiming by, under, or through such workman, for compensation in respect of any cause of action arising under this Act, and payment has not previously been made of any penalty or part of a penalty under any other Act of Parliament in respect of the same cause of action, such workman, representatives, or person shall not be entitled thereafter to receive any penalty or part of a penalty under any other Act of Parliament in respect of the same cause of action.

6.—(1.) Every action for recovery of compensation under this Act shall be brought in a county court, but may, upon the application of either plaintiff or defendant, be removed into a superior court in like manner and upon the same conditions as an action commenced in a county court may by law be removed.

(2.) Upon the trial of any such action in a county court before the judge without a jury one or more assessors may be appointed for the purpose of ascertaining the amount of compensation.

(3.) For the purpose of regulating the conditions and mode of appointment and remuneration of such assessors, and all matters of procedure relating to their duties and also for the purpose of consolidating any actions under this Act in a county court, and otherwise preventing multiplicity of such actions, rules and regulations may be made, varied, and repealed from time to time in the same manner as rules and regulations for regulating the practice and procedure in other actions in county courts.

"County Court" shall, with respect to Scotland, mean the "Sheriff's Court," and shall, with respect to Ireland, mean the "Civil Bill Court."

In Scotland any action under this Act may be removed to the Court of Session at the instance of either party, in the manner provided by, and subject to the conditions prescribed by, section nine of the Sheriff Courts (Scotland) Act, 1877.

In Scotland the sheriff may conjoin actions arising out of the same occurrence or cause of action, though at the instance of different parties and in respect of different injuries.

7. Notice in respect of an injury under this Act shall give the name and address of the person injured, and shall state in ordinary language the cause of the injury and the date at which it was sustained, and shall be served on the employer, or, if there is more than one employer, upon one of such employers.

The notice may be served by delivering the same to or at the residence or place of business of the person on whom it is to be served.

The notice may also be served by post by a registered letter addressed to the person on whom it is to be served at his last known place of residence or place of business; and, if served by post, shall be deemed to have been served at the time when a letter containing the same would be delivered in the ordinary course of post; and, in proving the service of such notice, it shall be sufficient to prove that the notice was properly addressed and registered.

Where the employer is a body of persons corporate or unincorporate, the notice shall be served by delivering the same at or by sending it by post in a registered letter addressed to the office, or, if there be more than one office, any one of the offices of such body.

A notice under this section shall not be deemed invalid by reason of any defect or inaccuracy therein, unless the judge who tries the action arising from the injury mentioned in the notice shall be of opinion that the defendant in the action is prejudiced in his defence by such defect or inaccuracy, and that the defect or inaccuracy was for the purpose of misleading.

8. For the purposes of this Act, unless the context otherwise requires—

The expression "person who has superintendence entrusted to him" means a person whose sole or principal duty is that of superintendence, and who is not ordinarily engaged in manual labour;

The expression "employer" includes a body of persons corporate or unincorporate:

The expression "workman" means a railway servant and any person to whom the Employers and Workmen Act, 1875, applies.

9. This Act shall not come into operation until the first day of January one thousand eight hundred and eighty-one, which date is in this Act referred to as the commencement of this Act.

10. This Act may be cited as the Employers' Liability Act, 1880, and shall continue in force till the thirty-first day of December one thousand eight hundred and eighty-seven, and to the end of the then next Session of Parliament, and no longer, unless Parliament shall otherwise determine, and all actions commenced under this Act before that period shall be continued as if the said Act had not expired.

THICKNESS OF WALLS. (London Building Act, 1894.)

SCHEDULES.

The First Schedule.—Preliminary.

Parts I. and II. of this Schedule apply to walls built of bricks not of less than 8½ inches long, or of stone or other blocks of hard and incombustible substance, the beds or courses being horizontal.

Structure of Buildings.

1. Every building, unless otherwise sanctioned in accordance with this Act, shall be enclosed with walls constructed of brick, stone, or other hard and incombustible substances, and the footings shall rest on the solid ground or upon concrete or upon other solid substructure. (Provided that open sheds, not exceeding 16 feet in height and not exceeding four squares in area, may be constructed of any substances and in any manner approved by the District Surveyor.)

Construction of Walls of Brick, Stone, &c.

2. Every wall constructed of brick, stone or other similar substances, shall be properly bonded and solidly put together with mortar or cement, and no part of such wall shall overhang any part underneath it (except to the extent of 6 inches, and provided that the projection be well and solidly corbelled out, and that the side of the wall opposite to the corbelling be carried up vertically in continuation of the inner face thereof). And all return walls shall be properly bonded together.

Extra Thickness of certain Stone Walls.

3. The thickness of every wall, not being built of bricks or stone, or other hard and incombustible substances laid in horizontal beds or courses, shall be one-third greater than the thickness prescribed in Parts I. and II. of this Schedule.

Thickness of Walls built of Materials other than such Bricks as aforesaid.

4. (The thickness of any wall of a dwelling-house, if built of materials other than those before specified, shall be deemed to be sufficient if made of the thickness required by Parts I. and II. of this Schedule, or of such thickness as may be approved by the Council.)

Hollow Walls.

5. (When hollow walls are constructed there shall be a wall on one side of the hollow space of the full thickness prescribed by this Act.)

Height of Storey.

6. The heights of storeys shall be measured as follows:—

(*a*) The height of a topmost storey shall be measured from the level of the underside of its floor joists up to the level of the under surface of the tie of the roof or other covering, or if there is no tie, then up to

the level of half the vertical height of the rafters or other support of the roof;

(*b*) The height of every storey other than a topmost storey shall be (measured from the level of the underside of the floor joists of the storey up to the level of the underside of the floor joists of the storey next above it).

Height of External and Party Walls.

7. For the purpose of determining the thickness of a wall, the height of such wall shall be measured from the base of the wall to the top of the topmost storey (whether such wall is carried to the full height or not, or in case of a gable when there are no storeys in the roof, to half the height of the gable).

Length of Walls.

8. Walls are deemed to be divided into distinct lengths by return walls, and the length of every wall is measured from the centre of one return wall to the centre of another, provided that such return walls are external party or cross walls of the thickness required under this Schedule, and bonded into the walls so deemed to be divided.

Footings of Walls.

9. (Unless with the consent of the Council every wall other than a wall carried on a bressummer shall have footings)—

The projection of the bottom of the footing of every wall on each side of the wall shall be at least equal to one-half of the thickness of the wall at its base (unless an adjoining wall interferes, in which case the projection may be omitted where that wall adjoins), and the diminution of the footing of every wall shall be formed in regular offsets, and the height from the bottom of such footing to the base of the wall shall be at the least equal to twe-thirds of the thickness of the wall at its base.

Underpinning.

10. (The underpinning of walls and chimneys shall be built with brick or stone bedded in cement to the full thickness of the old wall or work, and with proper footings, or to an additional thickness if the increased height of the wall so requires, and shall rest on the solid ground or on concrete, or on other solid substructure as a foundation, and the whole shall be executed to the satisfaction of the District Surveyor.)

Thickening of Walls.

11. (A wall shall not be thickened except after notice served on the District Surveyor of the intention to thicken, and the thickening shall be executed with brick or stone work in cement properly bonded to the old work to the satisfaction of the District Surveyor.)

THICKNESS FOR WALLS OF BUILDINGS NOT PUBLIC AND NOT OF THE WAREHOUSE CLASS.

The external and party walls shall be of not less thickness than the thickness hereinafter specified in each case, viz.:—

Height up to 25 ft.	Length up to 30 ft. Not more than two storeys For its whole height, 8½ in.		Length over 30 ft. or comprising more than two storeys. Below the topmost storey, 13 in. Remainder, 8½ in.
Height, 25 to 40 ft.	Length up to 35 ft. Below the topmost storey, 13 in. Remainder, 8½ in.		Length over 35 ft. One storey, 17½ in. For the rest of its height below topmost storey, 13 in. Remainder, 8½ in.
Height, 40 to 50 ft.	Length up to 30 ft. One storey, 17½ in. For the rest of its height below topmost storey, 13 in. Remainder, 8½ in.	Length 30 to 45 ft. Two storeys, 17½ in. Remainder, 13 in.	Length over 45 ft. One storey, 21½ in. Next storey, 17½ in. Remainder, 13 in.
Height, 50 to 60 ft.	Length up to 45 ft. Two storeys, 17½ in. Remainder, 13 in.		Length over 45 ft. One storey, 21½ in. Next two storeys, 17½ in. Remainder, 13 in.
Height, 60 to 70 ft.	Length up to 45 ft. One storey, 21½ in. Next two storeys, 17½ in. Remainder, 13 in.		* Length over 45 ft. One storey, 26 in. Next two storeys, 21½ in. For the rest of its height below the topmost two storeys, 17½ in. Remainder, 13 in.
Height, 70 to 80 ft.	Length up to 45 ft. One storey, 21½ in. Next three storeys, 17½ in. Remainder, 13 in.		* Length over 45 ft. One storey, 26 in. Next three storeys, 21½ in. For the rest of its height below the topmost two storeys, 17½ in. Remainder, 13 in.

TABLE—*continued.*

Height, 80 to 90 ft.	Length up to 45 ft. One storey, 26 in. One storey, 21½ in. Next three storeys, 17½ in. Remainder, 13 in.	* Length over 45 ft. One storey, 30½ in. One storey, 26 in. Next three storeys, 21½ in. For the rest of its height below the topmost two storeys, 17½ in. Remainder, 13 in.
Height, 90 to 100 ft.	Length up to 45 ft. One storey, 26 in. Next two storeys, 21½ in. Next three storeys, 17½ in. Remainder, 13 in.	* Length over 45 ft. One storey, 30½ in. Next two storeys, 26 in. Next three storeys, 21 in. For the rest of its height below the topmost two storeys, 17½ in. Remainder, 13 in.
Height, 100 to 120 ft.	Length up to 45 ft. One storey, 30 in. Next two storeys, 26 in. Next two storeys, 21½ in. Next three storeys, 17½ in. Remainder, 13 in.	* Length over 45 ft. One storey, 34½ in. Next two storeys, 30½ in. Next two storeys, 26 in. Next three storeys, 21½ in. For the rest of its height below the topmost two storeys, 17½ in. Remainder, 13 in.

* Subject to the provision respecting distribution of piers (*see* § 3, p. 382).

Condition in Respect of Storeys exceeding Certain Height.

10. If any storey exceeds in height sixteen times the thickness prescribed under this Schedule for the walls of such storey, the thickness of such external and party wall throughout such storey shall be increased to one-sixteenth part of the height of the storey, and the thickness of each external and party wall below that storey shall be increased to a like extent, but any such additional thickness may be confined to piers properly distributed of which the collective widths amount to one-fourth part of the length of the wall.

Restriction in Case of Certain Storeys.

11. No storey enclosed with walls less than 13 inches in thickness shall be more than 10 feet in height between the floor and the ceiling thereof, or between the floor and the tie of the roof.

Rule as to Buildings not being Public Buildings or Buildings of the Warehouse Class.

12. All buildings, excepting public buildings and such buildings as are in this Act defined to be buildings of the warehouse class, shall as respects the thickness of their walls be subject to the provisions contained in this part of this Schedule.

BUILDINGS OF THE WAREHOUSE CLASS.

The expression "building of the warehouse class" means a warehouse, factory, manufactory, brewery or distillery, and any other building exceeding in cubical extent 150,000 cubic feet, which is neither a public building nor a domestic building.

Thickness at Base.

The external and party walls of buildings of the warehouse class shall at the base be made of not less thickness than the thickness hereinafter specified in each case, viz.:—

<table>
<tr><td>Height up to 25 ft.</td><td colspan="3">For any length.
Base, 13 in.</td></tr>
<tr><td>Height, 25 to 30 ft.</td><td colspan="2">Length up to 45 ft.
Base, 13 in.</td><td>Length over 45 ft.
Base, 17½ in.</td></tr>
<tr><td>Height, 30 to 40 ft.</td><td>Length up to 35 ft.
Base, 13 in.</td><td>Length, 35 to 45 ft.
Base, 17½ in.</td><td>Length over 45 ft.
Base, 21½ in.</td></tr>
<tr><td>Height, 40 to 50 ft.</td><td>Length up to 30 ft.
Base, 17½ in.</td><td>Length, 30 to 45 ft.
Base, 21½ in.</td><td>Length over 45 ft.
Base, 26 in.</td></tr>
<tr><td>Height, 50 to 60 ft.</td><td colspan="2">Length up to 45 ft.
Base, 21½ in.</td><td>Length over 45 ft.
Base, 26 in.</td></tr>
<tr><td>Height, 60 to 80 ft.</td><td colspan="2">Length up to 45 ft.
Base, 21½ in.</td><td>* Length over 45 ft.
Wall to be increased in thickness from base to within 16 ft. of the top of the wall by 4½ in.</td></tr>
</table>

TABLE—*continued.*

Height, 80 to 100 ft.	Length up to 45 ft. Base, 26 in.	* Length over 45 ft. Wall to be increased in thickness from base to within 16 ft. of the top of the wall by 4½ in.
Height, 100 to 120 ft.	Length up to 45 ft. Base, 31 in.	* Length over 45 ft. Wall to be increased in thickness from base to within 16 ft. of the top of the wall by 4½ in.

* Subject to the provision respecting distribution of piers (*see* § 3, p. 382).

11. The thickness of the wall at the top and for 16 feet below the top shall be 13½ inches, and the intermediate parts of the wall between the base and 16 feet below the top, shall not be of less thickness than would be the case if the wall were to be built solid throughout the space between straight lines drawn on each side of the wall and joining the thickness at the base to the thickness at 16 feet below the top:

Nevertheless in walls not exceeding 30 feet in height the walls of the topmost storey may be 9 inches thick, provided the height of that storey does not exceed 10 feet.

Condition in Respect of Storeys exceeding a Certain Height.

12. If in any storey of a building of the warehouse class the thickness of the wall, as determined by the provisions of this Schedule, is less than one-fourteenth part of the height of such storey, the thickness of the wall shall be increased to one-fourteenth part of the height of the storey, and the thickness of each external and party wall below that storey shall be increased to a like extent, but any such additional thickness may be confined to piers properly distributed, of which the collective widths amount to one-fourth part of the length of the wall.

Thickness of Walls built of Materials other than such Bricks as aforesaid.

13. The thickness of any wall of a building of the warehouse class, if built of materials other than those before specified, shall be deemed to be sufficient if made of the thickness required by the provisions of this Schedule, or of such other thickness as may be approved by the Council.

MISCELLANEOUS.—*Cross Walls.*

1. The thickness of a cross wall shall be two-thirds of the thickness hereinbefore required for an external or party wall of the same dimensions and belonging to the same class of buildings, but never less than 8½ inches; and no wall subdividing any building shall be deemed to be a cross wall unless it is carried up to the floor of the topmost storey, and unless in each storey the aggregate

extent of the vertical faces or elevations of all the recesses, and that of all the openings therein taken together, does not exceed one-half of the whole extent of the vertical face or elevation of the wall.

2. Wherever a cross wall becomes in any part an external wall, such cross wall shall be of the thickness required for an external wall of the same height and length, and belonging to the same class of buildings.

3. Where an increase of thickness is by any rule of Part I. or Part II. of this Schedule required in case of a wall exceeding 60 feet in height and 45 feet in length, or in case of a storey exceeding in height sixteen times or fourteen times (as the case may be) the thickness prescribed for its walls, or in case of a wall below such storey, the increased thickness may be confined to piers properly distributed, of which the collective widths amount to one-fourth part of the length of the wall.

THE SECOND SCHEDULE.

The following materials shall for the purposes of this Act be deemed to be fire-resisting materials:—

1. Brickwork constructed of good bricks, well burnt, hard and sound, properly bonded and solidly put together—

(*a*) With good mortar compounded of good lime and sharp clean sand, hard clean broken brick, broken flint, grit or slag; or

(*b*) With good cement; or

(*c*) With cement mixed with sharp clean sand, hard clean broken brick, broken flint, grit or slag.

2. Granite and other stone suitable for building purposes by reason of its solidity and durability.

3. Iron, steel and copper.

4. Oak and teak and other hard timber, when used for beams or posts, or in combination with iron, the timber and the iron (if any) being protected by plastering in cement or other incombustible or non-conducting external coating.

In the case of doors—

oak or teak or other hard timber not less than 2 inches thick.

In the case of staircases—

oak or teak or other hard timber with treads, strings and risers not less than 2 inches thick.

5. Slate, tiles, brick and terra-cotta, when used for coverings or corbels.

6. Flagstones when used for floors over arches, but not exposed on the underside, and not supported at the ends only.

7. Concrete composed of broken brick, stone chippings, or ballast, and lime, cement or calcined gypsum when used for filling in between joists of floors.

8. Any material from time to time approved by the Council as fire-resisting.

Public Buildings.

27. The expression "public building" means a building used or constructed or adapted to be used, as a church, chapel or other place of public worship, or as a school, college or place of instruction (not being merely a dwelling-house so used), or as a hospital, workhouse, public theatre, public hall, public concert-room, public ball-room, public lecture-room, public library, or public exhibition room, or

as a public place of assembly, or used or constructed or adapted to be used for any other public purpose; also a building used or constructed or adapted to be used as an hotel, lodging-house, home, refuge, or shelter, where such building extends to more than 250,000 cubic feet, or has sleeping accommodation for more than 100 persons.

Construction of Public Buildings.

78. Notwithstanding anything in this Act every public building, including the walls, roofs, floors, galleries and staircases, and every structure and work constructed or done in connection with or for the purposes of the same, shall be constructed in such manner as may be approved by the District Surveyor, or in the event of disagreement may be determined by the Tribunal of Appeal; and save so far as respects the rules of construction, every public building shall throughout this Act be deemed to be included in the term building and be subject to all the provisions of this Act, in the same manner as if it were a building erected for a purpose other than a public purpose.

No public building shall be used as such until the District Surveyor or the Tribunal of Appeal shall have declared his or their approval of the construction thereof.

After the District Surveyor shall have so declared his approval, or shall certify that it has been constructed as directed by the Tribunal of Appeal, any work affecting or likely to affect the building shall not be done to, in, or on the building without the approval of the District Surveyor or such Certificate as aforesaid.

PATENTS, TRADE-MARKS, AND DESIGNS.

Patents.—In many countries valid patents cannot be obtained for an invention if it has become publicly known or worked within the realm, whilst, in some countries, previous publication in any country would invalidate a patent applied for subsequently. Inventors should therefore take great care to avoid publication of their inventions until they have obtained protection in the various countries in which it is intended to obtain patents.

Patents for inventions can be obtained in nearly all civilised countries, the more important of which are given in pages 385 and 386. The charges given are those which would be incurred in average cases, and are inclusive of government fees and patent agents' charges for the periods stated.

Trade-marks may be registered in nearly all civilised countries, and in such cases they are not protected until registration is effected. It is therefore advisable for firms or persons trading with other countries to register their trade-marks as soon as possible. The period of protection for trade-marks is usually about fourteen years, and is renewable.

Designs can be protected in many countries for a few years at a comparatively small cost.

Copyright in respect of books, plays, musical compositions, and articles of statuary, may be secured in many foreign countries and colonies. Application for copyright must, however, in most cases be made within a limited period after publication.

A great reduction has been made in the renewal fees upon English patents. They are now as follows:—Before the end of fourth year, 5*l.*; before the end of fifth year, 6*l.*; and so on, increasing 1*l.* annually.

Principal Countries and Colonies.	Period for which protection is granted.	Average cost of obtaining patents.			Periods covered by foregoing payments.	Periods at which subsequent payments (if any) become due to keep patents in force.	Periods after date of patent within which in certain countries working must be commenced to avoid forfeiture.	Trade Marks.		
Great Britain and Ireland:	months	£	s.	d.	months			£	s.	d.
Provisional Protection	9	4	4	0	9	..	not required	3	0	0
	years				years					
Completing Patent ..	14	10	10	0	4	annually	not required		..	
Austria-Hungary	15	12	0	0	1	annually	1 year	8	8	0
Ditto	15	20	0	0	3	annually	1 year		..	
Ditto	15	25	0	0	5	annually	1 year		..	
America (United States)	17	20	0	0	17	none	not required	13	0	0
Argentine Republic ..	5	40	0	0	5	none	2 years	20	0	0
Ditto ..	10	65	0	0	10	none	2 years		..	
Ditto ..	15	100	0	0	15	none	2 years		..	
Australia (Western) ..	14	18	0	0	4	4th and 7th year	not required	6	0	0
Australia (Southern) ..	14	18	0	0	3	3rd and 7th year	not required	10	0	0
Belgium	20	7	0	0	1	annually	1 year	6	0	0
Brazil	15	33	0	0	1	annually	3 years	12	0	0
Canada	15	16	0	0	5	5th and 10th year	2 years	12	0	0
Cape of Good Hope ..	14	28	0	0	3	3rd and 7th year	not required	20	0	0
Chili	15	65	0	0	15	none	not required	20	0	0
Denmark	5	13	0	0	5	none	1 year	8	0	0
France	15	10	0	0	1	annually	2 years	6	0	0
Germany	15	12	0	0	1	annually	3 years	10	0	0
Holland						No patents are granted.		10	0	0
India	14	22	0	0	4	annually	not required	8	0	0

Principal Countries and Colonies.	Period for which protection is granted.	Average cost of obtaining patents.			Periods covered by foregoing payments.	Periods at which subsequent payments (if any) become due to keep patents in force.	Periods after date of patent within which in certain countries working must be commenced to avoid forfeiture.	Trade Marks.		
	years.	£	s.	d.	years.			£	s.	d.
Italy	15	16	0	0	1	annually	1 or 2 years	8	0	0
Mexico	20	55	0	0	20	none	5 years	20	0	0
New Zealand	14	17	0	0	5	4th and 7th year	not required	6	0	0
New South Wales	14	20	0	0	14	none	not required	8	0	0
Natal	14	25	0	0	3	3rd and 7th year	not required	10	0	0
Norway	15	15	0	0	1	annually	3 years	8	0	0
Portugal	15	30	0	0	1	—	2 years	9	0	0
Ditto	15	40	0	0	5	—	2 years		—	
Ditto	15	46	0	0	15	—	2 years		—	
Queensland	14	18	0	0	4	4th and 8th year	not required	7	10	0
Russia	5	35	0	0	5	none	15 months	8	0	0
Ditto	10	75	0	0	10	none	2½ years		—	
Spain	20	17	0	0	1	annually	2 years	8	0	0
Sweden	15	16	0	0	1	annually	3 years	8	0	0
Switzerland	15	11	0	0	1	annually	3 years	8	0	0
Tasmania	14	23	0	0	3	3rd and 7th year	not required	6	10	0
Turkey	15	25	0	0	1	annually	2 years	12	0	0
Venezuela	5	55	0	0	5	none	6 months	25	0	0
Ditto	10	70	0	0	10	none	1 year		—	
Ditto	15	85	0	0	15	none	2 years		—	
Victoria	14	18	0	0	3	3rd and 7th year	not required	6	0	0

The above charges are generally exclusive of drawings.

A great reduction has been made in the renewal fees upon English patents. They are now as follows:—Before the end of fourth year, 5*l.*; before the end of fifth year, 6*l.*; and so on, increasing 1*l.* annually.

DORMAN, LONG, & CO., MIDDLESBROUGH.

ROLLED STEEL JOISTS IN STOCK.

No. of Section.	Weight per foot in lbs.	Normal Size in inches.	Lengths usually kept in Stock.	Distributed load in tons that 1 ft. will carry being, 1–3rd of the breaking strain.	1–4th of the breaking strain.	1–5th of the breaking strain.
G 1	89	20 × 7½	20 to 40 ft.	1170·91	878·18	702·54
G 2	75	18 × 7	20 „ 45 „	909·06	681·8	545·43
G 3	62	16 × 6	10 „ 50 „	642·09	481·57	385·25
G 3A	50	16 × 5	10 „ 50 „	494·67	371·01	296·8
G 4	59	15 × 6	10 „ 50 „	585·05	438·79	351·03
G 5	42	15 × 5	10 „ 45 „	393·01	294·76	235·81
G 6	57	14 × 6	10 „ 45 „	528·91	396·38	317·34
G 6A	46	14 × 6	20 „ 30 „	429·27	321·95	257·56
G 6B	41½	13 × 5	10 „ 40 „	328·91	246·68	197·35
G 7	54	12 × 6	10 „ 45 „	438·41	328·8	263·04
G 8	39	12 × 5	10 „ 40 „	301·6	226·2	180·96
G 7A	32	12 × 5	10 „ 40 „	261·86	196·4	157·12
G 7B	44	12 × 6	10 „ 45 „	372·6	279·5	223·6
G 9	45	10 × 6	10 „ 40 „	307·15	230·36	184·26
G 10	35	10 × 5	10 „ 40 „	227·52	170·64	136·51
G 10A	29	10 × 5	10 „ 30 „	201·48	151·11	120·89
G 11	30	10 × 4½	10 „ 40 „	201·12	150·84	120·67
G 11A	36	9 13/16 × 4½	15 „ 40 „	224·97	168·73	134·98
G 12	58	9 × 7	15 „ 40 „	342·61	256·96	205·56
G 13	20	9 × 3¾	10 „ 40 „	118·54	88·91	71·12
G 14	35	8 × 6	10 „ 40 „	198·37	148·78	119·03
G 15	30	8 × 5	10 „ 40 „	166·86	125·14	100·11
G 16	25	8 × 4	10 „ 40 „	130·2	97·65	78·12
G 16A	19	8 × 4	10 „ 40 „	100·41	75·3	60·24

ROLLED STEEL JOISTS IN STOCK—*continued.*

No. of Section.	Weight per foot in lbs.	Normal Size in inches.	Lengths usually kept in Stock.	Distributed load in tons that 1 ft. will carry being, 1–3rd of the breaking strain.	1–4th	1–5th
G 17	18	7 × 3⅜	10 to 40 ft.	85·31	63·98	51·18
G 17A	16	7 × 3⅜	10 „ 40 „	73·1	54·82	43·86
G 18	18	6¼ × 3½	10 „ 40 „	75·29	56·47	45·17
G 19	25	6 × 5	10 „ 40 „	103·01	77·26	61·81
G 19A	20	6 × 4½	10 „ 40 „	79·05	59·28	47·42
G 20	16	6 × 3	10 „ 30 „	59·59	44·69	35·75
G 20A	13	6 × 3	10 „ 30 „	49·23	36·92	29·53
G 21	12	6 × 2	10 „ 30 „	39·3	29·47	23·58
G 22	10½	5½ × 2	10 „ 30 „	33·35	25·01	20·01
G 22A	9	5¼ × 1½	10 „ 30 „	23·75	17·81	14·25
G 23	24	5 × 5	10 „ 40 „	84·05	63·04	50·43
G 24	22	5 × 4½	10 „ 40 „	76·62	57·47	45·97
G 24A	19	5 × 4 3/16	10 „ 40 „	62·83	47·12	37·7
G 25	15	5 × 3	10 „ 30 „	45·76	34·32	27·46
G 25A	11	5 × 3	10 „ 30 „	38·82	29·12	23·29
G 26	10	4⅜ × 1⅜	10 „ 30 „	25·38	19·04	15·23
G 26A	6½	4⅜ × 1⅜	10 „ 30 „	19·4	14·5	11·6
G 27	14	4⅝ × 3	10 „ 30 „	40·49	30·37	24·29
G 28	12	4 × 3	10 „ 30 „	32·1	24·08	19·26
G 28A	9½	4 × 3	10 „ 30 „	26·8	20·1	16·06
G 29	8	4 × 1⅜	10 „ 30 „	18·34	13·76	11·0
G 29A	5	4 × 1⅜	10 „ 30 „	12·899	9·67	7·73
G 30	10½	3½ × 3	10 „ 30 „	23·85	17·88	14·31
G 31	6	3½ × 1½	10 „ 30 „	11·82	8·86	7·09
G 32	10	3 × 3	10 „ 30 „	19·95	14·96	11·97
G 33	4	3 × 1¼	10 „ 30 „	6·96	5·22	4·18

All this steel is manufactured by the "Siemens-Martin" process and has a tensile strength of 28 to 32 tons on the square inch, and is made to pass Lloyd's and Admiralty tests.

John Tann, Newgate Street.

Party Wall Doors and Frames.

	New Pattern.			Panelled Doors.		
	£	s.	d.	£	s.	d.
6 ft. by 2 ft. 6 in. ..	5	12	6	7	0	0
7 „ „ 3 „ 0 „ ..	7	0	0	9	0	0

Special sizes, 7*s.* 6*d.* & 8*s.* 9*d.* per super. foot.

Sliding Party Wall Doors complete, 6*s.* 6*d.* per super. foot.

Strong Room and Plate Closet Doors.

	Strong Room Doors and Frames. Not Fireproof.			Fireproof.			Plate Closet Doors and Frames.		
	£	s.	d.	£	s.	d.	£	s.	d.
6 ft. 0 in. by 2 ft. 6 in. ..	15	10	0	17	0	0	12	0	0
6 „ 6 „ „ 2 „ 9 „ ..	18	0	0	20	0	0	13	10	0
7 „ 0 „ „ 3 „ 0 „ ..	22	0	0	24	0	0	15	15	0

Special sizes, 22*s.*, 24*s.*, and 16*s.* 6*d.* per foot super.

Fireplace Lintels.

This system of building a flue secures sound work and prevents the possibility of smoky chimneys, and obviates the use of cowls.

Nett prices ex warehouse.

Opening.	s.	d.
1 ft. 6 in.	3	6
2 ft. to 2 ft. 6 in.	6	6
2 ft. 9 in. and 3 ft.	7	0
3 ft. 2 in. and 3 ft. 3 in.	7	9
3 ft. 6 in.	9	0
3 ft. 9 in.*	10	6
4 ft.	13	6
4 ft. 6 in. and 5 ft.	16	0
5 ft. 6 in. and 6 ft.	20	0

* This size and upwards prepared with side flues for kitchen openings.

Lifts (Approximate Price List).

The following prices include delivery and fixing in London, but are exclusive of any builder's work, or boreholes for direct-acting lifts.

Load.	5 cwt.		10 cwt.		15 cwt.	
Travel.	50 ft.		50 ft.		50 ft.	
Description.	Price Fixed in London.	Extra travel per ft.	Price Fixed in London.	Extra travel per ft.	Price Fixed in London.	Extra travel per ft.
Hydraulic Lifts.						
High Pressure, say 700 lbs. to 1000 lbs per sq. in.	£	£ s. d.	£	£ s. d.	£	£ s. d.
Suspended passenger ..	250	1 1 0	278	1 6 0	295	1 10 0
„ goods	150	0 18 0	173	0 19 0	190	1 1 0
Direct-acting passenger	270	2 15 0	310	3 3 0	340	3 10 0
Patent balance for do. ..	180	2 0 0	210	2 7 0	230	2 15 0
Low Pressure, say 30 lbs. per sq. in., or 70 ft. head.						
Suspended passenger ..	290	1 5 0	325	1 13 0	355	2 2 0
„ goods	180	1 3 0	220	1 10 0	250	1 17 0
Direct-acting passenger, with balance weights..	360	3 10 0	395	4 3 0	425	4 15 0
Electric Lifts.						
Suspended passenger ..	295	0 18 0	330	1 0 0	360	1 2 0
„ goods	210	0 15 0	245	0 18 0	270	1 0 0
Hand Power.						
Suspended passenger ..	98	0 9 0	110	0 11 0	120	0 13 0
„ goods	55	0 6 0	68	0 7 6	81	0 9 0

Note.—The passenger lift prices include for a cage of the p.c. value of 50*l.* each. The goods lift prices include for a cage with strong iron framing and well-seasoned wood panels.

All suspended lifts are fitted with improved safety gear.

Variable-power, Water-saving Lifts. — Messrs. Easton, Anderson & Goolden, Ltd., also manufacture Ker's patent lifts, by which the amount of water used each journey is *automatically* proportioned to the load raised. A considerable saving in the cost of working is thus ensured, as has been proved. Messrs. Easton, Anderson & Goolden, Ltd., will be pleased to give estimate for lifts of this type, and for converting existing lifts.

Hydraulic Rams (Approximate Price List).

The following prices include delivery in London:—

Size of Ram.	Price.	Spare set of inner and outer valves.	Approximate quantity of water raised with ratio of fall to lift of 8 to 1.
in.	£ s. d.	£ s. d.	
1¼	6 15 0	1 13 6	1100 gallons per day.
2	7 10 0	2 8 6	1800 „ „
3	10 10 0	3 6 6	3600 „ „
4	15 15 0	4 16 6	5800 „ „

Barker's Sun-Dials.

Vertical sun-dials for buildings, from £7 10s.
Brass horizontal sun-dials, suitable for gardens, from £3.
Pedestals for sun-dials, from £3 3s.

Silicate Cotton or Slag Wool (for sound and fire proofing).

	Per sqr. ft.
Laid loose for pugging floors 1¼ in. thick	2½d.
Yarn warp, 4 in. wide, for pipe covering, 1 in. thick..	8d.
Wire „ „ „ „	8½d.
In wire netting, 1 in. thick	6d.
„ „ 1¼ in. „	8d.
„ „ 2 in. „	10d.
„ „ 2½ in. „	1s.
„ „ 3 in. „	1s. 2d.

McNeill's Silicate Cotton or Slag Wool (for sound and fireproofing).

Laid loose for pugging floors 1¼ in. thick	2½d.
In wire netting, about 1 in. thick	7d. to 8d.
Silicate cloth, for pipe covering, in strips 4 in. wide, wire warp 1 in. thick..	9d.

F. Jones & Co.'s Patent British-made Silicate Cotton.

	Per ft. super.
Loosely packed, 1¼ in. thick	1½d.
Between wire netting, 1 in. thick	6d.
Patent combination slabs (*i.e.* plaster slabs lined with silicate cotton) ..	7d.

COST OF STREET PAVING IN LONDON.—Bridgman, from *Contract Journal*, January, 1894.

Material.	First cost.	Repairing per yard per annum during 15 years.	First cost and maintenance during whole period.	Average price per square yard over whole period.	Average duration with slight repairs.
ASPHALTE, 2½ in. thick, on 6 in. concrete.	13/6 (with two years' guarantee).	1/- (-/3 to 1/9)	29/6 per yard.	1/9	In main thoroughfares, 17 to 18 years. *Examples.* * CHEAPSIDE AND POULTRY.—First laid 1870. Traffic unstopped during 18 years, then relaid. * OLD BROAD STREET.—Traffic unstopped during 17 years, then relaid. THREADNEEDLE STREET.—Laid May, 1869. Relaid 1893, after 24 years' wear.
GRANITE, 9 in. × 3 in., on 6 in. concrete.	14/6 old price. (18/4 present price), with five years' guarantee, 16/9.	—	net 16/6	-/7½ old price, or -/9½ present price.	20 to 25 years. *Examples.* GRACECHURCH STREET.—25 years' wear, three relays. HIGH HOLBORN, 1857.—23 years' wear. SMITHFIELD.—Relaid after 20 years. Renewed for further 10 years.
		—	17/-	-/9 old price, -/10 present price.	
WOOD, on 6 in. concrete.	8/–, 8/6 if creosoted, with three years' guarantee.	-/9½ (-/7 to 1/-)	23/6	1/4½	9 years.

* The streets were laid with Val de Travers asphalte.

TABLE OF COMPARATIVE MERITS AND DEMERITS.—Isaacs.

—	First.	Second.	Third.	—	First.	Second	Third.
Public hygiene	Asphalte	Granite	Wood	Durability	Granite	Asphalte	Wood
Noiselessness	Wood ..	Asphalte	Granite	Economy	Granite	Wood ..	Asphalte
Safety for horses *	Wood ..	Asphalte	Granite	Facility of repairs	Asphalte	Wood ..	Granite
Cleansing	Asphalte	Granite	Wood	Facility for tramways ..	Granite	Wood ..	Asphalte

* This is under existing conditions as to cleansing.

CREASE'S PATENT ENAMELLED IRON COLD WATER CISTERN OR TANK.

Capacities.	Dimensions.						Gauge of Iron.	Prices.—Delivered in London.				
	Lengths.		Widths.		Depths.			Cisterns. (Open top.)			Tanks. (Closed top with removable cover.)	
Gallons.	ft.	in.	ft.	in.	ft.	in.	Inch.	£	s.	d.	£	s. d.
50	2	0	2	0	2	0	¼	2	15	0	3	10 0
100	3	0	2	8	2	0	¼	4	7	0	5	9 0
200	4	0	4	0	2	0	¼	7	0	0	8	15 0
300	3	7	3	7	3	7	¼	8	11	0	10	14 0
400	4	0	4	0	4	0	¼	10	12	6	13	5 0

PRICES OF WHITE AND COLOURED GLAZED BRICKS AT NUNEATON.

Per 1,000.	Brown, (various shades.)			White.			Buff.			Blue, Chocolate, Black, Grey.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Glazed one side..	8	0	0	9	0	0	11	0	0	13	0	0
Glazed one end..	7	5	0	8	5	0	10	5	0	12	5	0
Glazed flat..	10	0	0	11	0	0	13	0	0	15	0	0
Glazed one side, one end .	11	10	0	12	10	0	14	10	0	16	10	0
Glazed bull nose	11	10	0	12	10	0	14	10	0	16	10	0
Glazed two sides	12	7	6	13	7	6	15	7	6	17	7	6
Glazed two ends	10	12	6	11	12	6	13	12	6	15	12	6
Glazed one side, two ends	13	5	0	14	5	0	16	5	0	18	5	0
Glazed two sides, one end	14	2	6	15	2	6	17	2	6	19	2	6

Seconds White £2 per 1,000 less than best. Prices for Seconds in other colours on application, as also Samples and Rates of Carriage to any Station.

ELTERWATER, WESTMORLAND, SEA-GREEN ROOFING SLATES.

Quality.	Price per ton.		Computed to Cover.
	s.	d.	Sq. yards.
L.—Best Slate, 36 in. to 20 in. long, proportional widths	95	0	25 to 30
„ 20 in. to 12 in. „ „ „	90	0	
C.—Second Slate, 30 in. to 12 in. long, various widths .. (Recommended for colour, which is equal to best.)	65	0	22 to 25
P.—Best Peggies, 14 in. to 7 in. long .. .. (Equal to first quality in texture and colour.)	70	0	25 to 30
P.—Second Peggies, 12 in. to 5 in. long	40	0	22 to 25
T.—Thirds, 30 in. to 12 in. long, various widths .. .. (A strong Slate suitable for Mill Work, Farm Outbuildings, &c)	40	0	18 to 20

Railway Rate to London, 15*s.* 11*d.* per ton, in waggon loads.

ROBIN HOOD AND HOWLEY PARK STONE.

		s.	d.
1 in. Sawn two sides Slabs, random sizes	foot super.	0	3½
1¼ in. „ „ „ „	„	0	4
1½ in. „ „ „ „	„	0	4½
2 in. „ „ „ „ and upwards ..	foot cube	2	9
1½ in. to 2 in. random Outside Slabs	foot super.	0	4
2 in. to 2½ in. „ „ „	„	0	5
2½ in. to 3 in. „ „ „	„	0	6
3 in. and upwards thick	foot cube	2	3

ROBIN HOOD AND HOWLEY PARK STONE—*continued.*	*s.*	*d.*
All Inside and Outside Slabs, up to 2½ in. thick, cut to dimensions one way .. .. per foot super. extra	0	0½
All Inside and Outside Slabs, up to 2½ in. thick, cut to dimensions two ways .. .. per foot super. extra	0	1
All Inside and Outside Slabs, 3 in. and upwards thick, cut to dimensions one way .. .. per foot super. extra	0	1
All Inside and Outside Slabs, 3 in. and upwards thick, cut to dimensions two ways .. .. per foot super. extra	0	2
3 in. Sawn two sides Headstones .. .. foot super.	0	11
3½ in. „ „ „ .. .. „	1	1
4 in. „ „ „ .. .. „	1	3
4½ in. „ „ „ and upwards .. .. .. foot cube	3	8
Grave Curbs, Sawn three sides, 8 in. × 4 in. and upwards.. .. „	3	8
„ „ „ under 8 in. × 4 in. .. .. „	4	0
11 in. and 12 in. × 2½ in. Sawn two sides and Round Nosed, one edge, up to 4 ft. long.. .. .. foot run	0	9
11 in. and 12 in. × 3 in. Sawn two sides and Round Nosed, one edge, up to 4 ft. long.. .. .. foot run	0	9½
For Steps over 4 ft. long but not exceeding 6 ft. long, 1*d.* per foot extra for each thickness.		
12 in. × 6 in. and upwards, Sawn Bed and Edge Steps, random lengths .. .. foot cube	2	7
12 in. × 6 in. and upwards, Sawn Bed and Back-jointed Edge Steps, random lengths .. .. foot cube	2	9
12 in. × 6 in. and upwards to dimensions, 2*d.* per foot cube extra in both cases.		
12 in. × 6 in. and upwards, Sawn all round Steps, random lengths ft. cube	3	0
„ „ „ „ „ to dimensions „	3	3
8 in. × 2½ in. and upwards, Sawn three and four sides, random Sills and Coping .. .. foot cube	3	0
8 in. × 2½ in. and upwards, Sawn three and four sides, Sills and Coping to dimensions .. .. foot cube	3	3
5 in. Tooled Sinks .. .. foot super.	1	2
6 in. „ .. .. „	1	4
9 in. × 6 in. Sawn all round and Chamfered Coping .. .. .. foot run	1	5
„ „ „ „ „ and top side rounded foot run	1	6
Monumental Blocks, random sizes .. .. foot cube	1	10
„ „ cut to dimensions .. .. „	2	0
Random Building Blocks and Headstone Bases .. .. „	1	8
Second-quality Slabs, 2 in. thick and upwards, random sizes .. „	2	3
8 in. × 2½ in. and upwards, Sawn three and four sides, random Sills and Coping; second quality .. .. foot cube	2	8
8 in. × 2½ in. and upwards, Sawn three and four sides, random Sills and Coping; second quality, to dimensions .. .. foot cube	2	11
Rubbed, Weathered and Throated Sills, up to 12 in. × 3 in. or 9 in. × 4 in. .. .. foot cube	4	6
Tooled, Weathered and Throated Sills, up to 12 in. × 3 in. or 9 in. × 4 in. .. .. foot cube	4	3
Tooled, Weathered and Throated Sills, above 9 in. × 4 in. or 12 in. × 3 in. 9*d.* per foot cube less than above prices. For Grooving Sills add 3*d.* per foot cube to above prices in each case.		
Plain, Rubbed and Rebated Spandril Steps, ordinary sizes .. foot run	2	6
Plain Rubbed Spandril Steps, not Rebated .. .. „	2	3
18 in. × 3 in. to 2½ in. Weathered Coping, or any other size, as per section .. .. 3 in. 2½ in. .. .. foot cube	3	6
Throating Sills or Coping, other than Weathered Sills, 1*d.* per foot run extra.		

GARDEN SUN DIAL ON PEDESTAL.

These form a very interesting and attractive feature for Gardens, Lawns, &c.

They are made in ancient or modern styles, with or without Pedestal, also Vertical Sun-Dials, for Buildings, &c.

F. BARKER & SON,

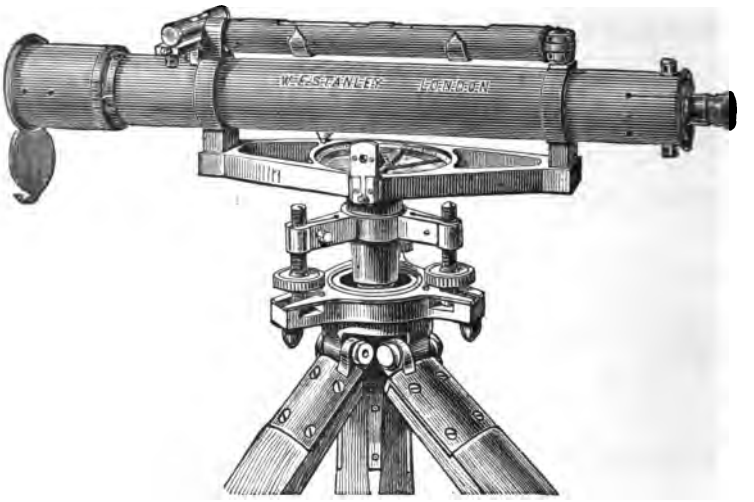
Sun Dial & Surveying Instrument Manufacturers.

12 CLERKENWELL ROAD, LONDON, E.C.

Please write for Illustrated and Descriptive Catalogues, post free.

N.B.—Our Goods can be ordered through most of the principal Opticians.

[*To face page* 394.



W. F. STANLEY,

OPTICIAN.

Drawing and Surveying Instrument Manufacturer,

Contractor to H.M. Government, also for India and Colonies.

Theodolites, Sextants, Levels, Compasses, and every description of Instrument and Material for Field and Office,

OF THE FIRST QUALITY, HIGHEST FINISH, AND MOST MODERATE PRICE.

Manufactured for the most part by **Self-Acting Machinery.**

MEDALS—*International Exhibitions*, 1862 and 1873.

GOLD MEDALS, *Inventions Exhibition*, 1885.
Mining Exhibition, 1890.

SILVER MEDAL, *Architects' Exhibition*, 1886.

ENGINE DIVIDER TO THE TRADE.

STANLEY,

GREAT TURNSTILE, HOLBORN, W.C., LONDON.

Telegrams: "TURNSTILE, LONDON." **Telephone No. 65188.**

[*To face Index.*

INDEX.

A.

PAGE

Abercarne Stone 189
Aberdeen Granite 219
——— Paving 221
Absorbent Powers of Stones 1
Abutments, Rules for 7
Abyssinian Tube Wells, Norton's 158
Accumulators 341, 361
Adamantine Clinkers 176, 180
——— Paving Bricks 270
Air-Bricks 176, 178, 182
——— Iron 290
— Propeller, Blackman 323
Algebraic Signs 2
Analysis of Bath Stone 109
——— Weldon Stone 189
Ancaster Stone 189
Ancient Lights, Table of 3
——— Rules for Calculating Obstruction 4, 5
Angles 131, 132
Angle and T Iron, Weight of .. 144, 145
Animals, Weight of Men and, .. 372
Anti-Corrosion Paint .. 304 to 306
Apparatus, Testing Electric 349
Approximate Cost of Buildings .. 5, 6
Arches, Gauged 170
——— Memoranda of .. .. 6 to 8
——— Rough 170
——— Table of Thickness for Crowns 8
Architraves, Steam made 247
Architects' Charges .. .. .. 8 to 12
——— Government Terms .. 9
Architecture, Five Orders of .. 38 to 45
——— Nomenclature of English 76
Arc Lamps 345
Area Gratings, Iron 290
Arrangements, Water-saving .. 328
Artesian Tube Wells .. . 157, 340†
Artificial Stone Paving 222
Ashes 176
Asphalte Damp Course 224
——— Hoisting 224
——— Notes on 224
Asphalte Paving 160, 224
——— Roofing 223
——— Felt 259

PAGE

Asphalte, Seyssel 223
——— Skirting 224
Asphalted Felt 224
Atkinson's Cement 276
Aubigny Stone 189
Automatic Disinfectors 284
——— Flushing Tanks 286
Ayrshire Stone 189

B.

Back Linings 241
Backs, Wood 242
Ballast 176, 221
——— Thames, Number of Cubic Feet to a Ton 36
Balls, Copper 282
——— Zinc 282
——— and Solid Cylinders, Weight of Cast Iron 144
Balusters, Iron 291
——— Wood 246
Banks, Forming, Price of 156
Bar Iron, Flat, Weight of, per lineal foot 148
——— Round and Square, Weight of, per lineal foot 149
Barn Floors 237
——— Floor Bricks 180
Barrows, ... 338
——— Filling into and Wheeling 155
Bars, Chimney 291
——— Saddle 320
Barrel Drains 159
Basketing-out Ground, Price of .. 155
Bath Fittings 287
Bath Stone 185, 186, 190, 191
——— Analysis of 109
——— Experiments on 109
Baths 284, 288
——— Shower 288
——— Slate 261
Batten floors 237
Battens .. .. .. 16, 231 to 233
——— Distinguishing Brands on 126 to 129
——— Flooring, Oak 238

PAGE

Battens, Table of Cubical Contents 17 to 19
Batteries, Electric 346, 360
Beams, Joints of 93
Bedding Stone, Notes on 190
Bell-hanger and Gasfitter .. 71, 300
Bell Traps 280, 290
Bells, Electric 300, 360
—— House 300
—— Weight of 146
Belgian Granite 219
Bending Glass 312, 319
Beer Freestone, Experiments on .. 108
—— Stone.. 191
Berwig Stone 191
Bethell's Process 85
——— Stone.. 190
Bib Valves 282
Bird's Mouth 172
Birmingham Wire Gauge 154
Blackman's Fan Ventilator 323
Blair Stone 200, 201
Blinds.. .. .. 327, 332
—— Laths 234
—— Venetian 241
Blocks 339, 340
Block Tin 279
Blue Lias Lime 176
——— Stone 196
Boarding 237
——— Sound 237
——— Weather 237
Boiler Screws 281
Boilers 348
Bolt and Stay, combined 254
Bolts, Casement . .. 254 to 256, 257*
—— Ends 289
—— Espagnolette 251, 255
—— Fixing 247
—— Iron 251, 291
—— Nuts, and Washers, Size of 95
—— Screw 291
Bolt-heads, Weight of 150
Bolt-holes in Girders 289
Bond, English 16
—— Flemish 16
—— Hoop Iron .. 16, 60, 172, 289
Bored Tube Wells, Artesian ..340†
Boring Tubes, Price of 157
Borings for Wells, Prices of 157
Boucherie's Process.. 85
Box Girders, Steel 289
—— Ground Stone 190, 191
Boxes, Wood 247
Boxing, Shutters 242
Boxings, Wood.. 242
Braces, Strength of 90
Bracketing.. 236
Brackets, Cut Wood 245, 246
——— for Harness, Iron 296

PAGE

Brackets, Gutter 290
——— Saddle 247
Brads, Weight of 151
Brass Knobs 251
—— Screws 251
—— Tubing 300
—— Washers.. 281
Brass, Weight of Feet Super. .. 144
—— Well Pumps 281
Bricks.. .. .. 14, 176
——— Adamantine Paving 270
——— Air 176, 178, 182
——— Barn Floor 180
——— Chamfered Stable 179
——— Chases 172
——— Chimneys 177
——— Coping 176
——— Culvert 181, 182
——— Curb 180
——— Enamelled 183
——— Experiments 110
——— Facings.. .. .. .. 172, 183
——— Faience.. 218
——— Fire 176, 179, 183, 184
——— Gault 177, 178, 179
——— Glazed 183, 393
——— Groins 172
——— Indents.. 172
——— Moulded 180, 181
——— Mullions 177
——— Nogging 13, 171
——— Opalite 183
——— Ornamental 177
——— Ovolos 177
——— Patent Glass-faced 184
——— Paving
13, 174, 176, 180, 181, 182, 183
——— Pillars 81
——— Place 176
——— Preservation of 84
——— Price at Broomielaw, Glasgow.. 179
——— Roman 15
——— in Sewers, Quantity of .. 142
——— Size and Weight of 12
——— Splays 172, 177
——— Stable 180, 181, 182
——— ——— Paving 296
——— Stocks 181
——— Strength of 110
——— Terro-metallic 176
——— Vitrified Granitic 183
——— Weight per 1000.. 13
——— Wharf Prices, Glasgow .. 179
——— Wharf Prices, London 177 to 181
——— Window Sill 182
Brickbats, Filling in Trenches with 156
Bricklayer, Day Work 176
Bricklayers' Memoranda 12 to 14, 65
——— Prices .. .. 167 to 184

PAGE

Brickwork .. .. 14 to 16
——— in Cement 173
——— Cleaning, Colouring, and Drawing.. 173
——— Cutting to 172
——— in Mortar 171
——— Moulded.. 177
——— Pointing.. 14
——— Spanish 15
——— Strength of 14
——— Tables of Value of, 167 to 169
——— Waterproofing Composition for 173
——— Weight of 15
Bridges 8
Broomhall Tiles 267, 268
Broseley Roofing Tiles 269
Brown's Wood Mosaic Floors .. 238
Buff Terra-cotta 217
Builders' Plant, Hire of 337, 338
——— Prices, Comparison of, in the Years 1703 and 1876 155
——— Work, Measurement of 64 to 72
Building Act, London, 1894 376 to 383
——— Block, Concrete 162
——— Stone, Strength of 108 to 110
——— Memoranda of— (Memoranda of Quarries, Component Parts of Stone, Colour, Price, &c., and Where Used, 95 to 109
Buildings, Approximate Cost of .. 5, 6
——— Public 382
Bullivant's Patent Sashes 241
——— Faience 218
Burnettizing 85

C.

Cable Casings.. 362
——— Electric 352
——— Main, Electric .. 350, 351, 352
Caen Stone 185, 186, 191
Campden Stone 191
Cant Bar 241
Capping, Wood.. 242
Carpenters' Materials .. 233 to 236
——— Memoranda .. ..16 to 19
——— Prices .. .. 225 to 236
——— Work 68
Carting 155, 176, 221
Casement Bolts.. .. .. .254 to 256
——— Fittings 253
——— Openers, Iron and Brass 292
——— Stays 261, 255
Casements, Wood 241
——— Wrought Iron .. 291, 292
——— and Frames, Wrought-iron.. .. .. 292 to 293*
Casings, Wood 246

PAGE

Carts, Filling into, Price of 155
Castings 19
——— to find their Weight from Patterns 19
——— Iron 290
Cast-iron 290
——— Balls and Solid Cylinders, Weight of, in lbs... 144
——— Columns, Strength of .. 23
——— Table of Breaking Weight 24
——— Girders 290
——— Strength of .. 53
——— Hollow Columns 24
——— Pipes.. 290
——— Pressure in 141
——— Weight of 146
——— Sashes 297
——— Stancheons, Table of Breaking and Safe Strengths 25 to 27
——— Standards 290
——— Weight of Superficial foot 144
Casterton Stone 192
Cathedrals, Dimensions of English 30
Cedar 225
Ceiling Connections, Electric .. 354
——— Flowers 278
——— Joists 46, 47
——— Labour on 236
——— Strength of .. 46, 47
Cells, Storage 349
Cements 19, 20
Cement 176, 177, 178
——— Atkinson's 276
——— Hydraulic 19
——— Isle of Sheppey.. 274
——— Keen's 276, 277
——— Martin's 273, 276
——— Metallic 276
——— Mouldings 273, 274, 277
——— Parian 276
——— Paving.. 274
——— Pilasters 274
——— Portland 20, 83, 84, 274, 276
——— Comparative Strength of 78
——— Nelson's 278
——— for Steam Joints 304
——— Quality, Weight, and Strength of 20
——— Roman.. .. .. 20, 274, 276
——— Skirtings, Martin's 273
——— Vulcan 304
Cementing.. .. .. 273, 274
Centering 235
Central Station Lighting 356
Ceralite Patent Bricks 184
Cesspools 236
Chases, Brick 172
Chains.. 21

PAGE

Chains, to find Breaking Weight of 21
——— Safe Working Load 21
——— Weight of 150
Chalk Lime 176
Chapelhall Stone 212
Chilmark Stone 192, 198
Chimney Bars 291
——— Pots 175, 179
——— Pieces, Slate 261
Chimneys, Brick 177
——— Notes on.. .. .. 21, 22
——— Smoky 21, 22
Churches 22
——— Requirements of Incorporated Society 22
Circle, to Find Centre of 6
——— Properties of 23
Circles, Table of Areas of 119 to 121
——— Circumference of 119 to 121
Circuits 352
Cisterns, Enamelled Iron 393
——— Galvanized Iron 340*
——— Iron 291
——— Slate 260, 266
Claircolle 275
Clay 221
—— Digging in, Price of 155
—— Number of Cubic feet to a Ton 36
—— Tempered.. 155
Cleaning, Colouring, and Drawing Brickwork 173
Cleft Oak Pales 230, 233
Clinkers 179
——— Adamantine 176, 180
——— Dutch 174, 176
Clipsham Stone 199, 200
Cloak Pegs, Wood 247
Closets, Earth 284
——— Water 245, 283, 284
Coach-house Door Hinges 296
Coal-plates 296
—— Space Occupied by a Ton .. 23
—— Tar 85
—— Weight of.. 23
Cocks 283
Colour 276
—— Wash 176
Colouring, Stopping, and Washing Plaster 274, 275
Colours, Common 301, 302
Columns, Cast-iron Hollow 24
——— Table of Breaking Weight .. .. 24 to 27
——— Fir, Strength of 81
——— Granite 219, 220
——— Iron 290
——— Marble 214
——— Slate 261
——— Stone.. 205

PAGE

Columns, Strength of 23
Combe Down Stone.. 190
Common Colours 301, 302
——— Rafters, Strength of .. 91
——— Scantling of .. 92
Comparison of Builders' Prices in the Years 1703 and 1876 . .. 155
Comparisons of Greek and Roman Orders 45, 45*
Composite Order 44
Composition, Macbean's Magnetic, 304
Concrete, 65, 161 to 164, 221, 224, 277
——— Building 27
——— Blocks 162
——— Examples of Cost by Leaning.. .. .. 161, 162
——— Flooring 164
——— Notes on 161
——— Slabs for Building 163
——— Slag, Price of 163, 164
——— Walling 162, 163
——— under Water 28
Conductors 343
——— Lightning .. 363 to 365
——— Overhead 345
Conducting Power of Various Materials 58
Conductivity 352
Connections, Ceiling, Electric .. 354
——— Earth, Electric 364
Contracts, Large, Note on 155
Coping Bricks 176
——— Cramps.. .. .. .. 187, 216
——— Tile, in Cement 173
Copings, Price of 180, 182
——— Terra Cotta 178
Copper.. .. ..279, 300
——— Coping Cramps 216
——— Hole, Door, and Frame .. 291
——— Nails 300
——— Weight of 151
——— Pipes 300
——— Weight of per lineal foot in lbs. 147
——— Pipe, Tinned 294
——— Sheet 300
——— Tacks 300
——— Tubing 300
——— Water-balls 281
——— Weight of Foot Super. .. 144
Coppers, Washing 300
——— Weight of 151
Cord, Silk 93
Corinthian Order .. .. .. 43 to 44
Corngrit Stone 190
Cornices, Plaster 272, 278
——— Washing, Stopping, and Colouring 275
Cornish Granite 218
Corsham Down Stone 190, 191

PAGE

Corsehill Stone 192
——— Experiments on 108, 109
Corrugated Iron 28, 291
——— Weight of 28, 29
——— Tiles 317
Cost of Drainage of Towns 34
——— Heating 58
——— Street Paving in London .. 392
Cotton, Silicate 391
Covers, Manhole 286
Cow-house Fittings 297
Craigleith Stone 189, 212
Cramps, Coping 187, 216
Crate Laths 234
Creasing, Tile 172
Creosoting 85
Cross Walls, Thickness of 381
Crown Glass, Usual Thickness .. 309
Cubes, Table of .. .. .. 116 to 118
Cubical Contents of Timber in Floors, &c. 29
Cubic Feet of Timber Equal to One Ton 16
Culvert Bricks, Price of 181, 182
Cupboards 243
Curb Bricks 180
Cure of Dry Rot 35
Cut Brackets, Wood 247
Cutting Rock 155
——— to Brickwork 172
——— Tiler 267
Cuttings, Dressing and Solling Slopes of 156
Cut-outs 345, 352, 354
Cylinders, Strength of Solid 23
——— Weight of Cast-iron Balls and Solid 144

D.

DAMP Course, Asphalte 224
——— Proof Course 30, 178, 268
——— Walls, Anti-corrosion Paint for .. .. 304 to 306
——— Recipe for . 30, 84, 176
Deal Fixed and Fitted 240
——— Standards, Table of Cubical Contents .. .. 17 to 19
Deals 16, 225, 231, 233
——— Distinguishing Brands on, 126 to 129
Decay of Wood 30
Decimal Equivalents of Inches Feet, and Yards 371
Decimal Equivalents of Pounds, and Ounces 371
Decorated Mouldings 57
Delivery of Water in Pipes 141
Devonshire Marble 214
Diaper, Terra Cotta 178
Dimensions of English Cathedrals 30
——— of Public Halls 31
Digging 155
——— in Clay 155
——— Gravel 155
——— Sewers 142
——— Surface 155
Disconnecting Channel 286
Distribution Board 351, 354
Ditches, Price of 156
Dobbin Cart, Size of 36
Doors 244
——— American White Pine .. 249
——— Frames 244
——— and Frame, Copper-hole, Iron 291
——— Frames, Iron 290, 297
——— Frames, Steam Made 247
——— Furniture 252, 253, 254
——— Hinges, Coach-house 296
——— Iron 329, 389
——— Loose Box 296
——— Plate Closet 389
——— Party Wall 389
——— Sash 244
——— Sliding Gear 329
——— Strong Room 389
——— Springs .. 251, 252, 257*, 257†
——— Steam made 248
Doric Order 38, 40, 41
——— Greek 44*
Doulting Stone, Labour on a 192
Drainage of Land, Table of 31
——— Towns, Cost of 34
Drain Pipes 176, 286
——— Pots, Iron 296
——— and Sewers .. .. .. 32 to 34
——— Ventilation of 137
Drains, Barrel 159
Drains, Glazed Stoneware Pipe .. 159
Drawing Instruments .. 330 to 332
Drawn Lead 279
Dressers 243
Dresser Tops 240
Drilling Bolt Holes in Girders .. 289
Drip Course 180
Driving Ferrules 280
Dryers 304
Dry Rot, Cure of 35
D Traps 281
Duffy & Son's Wood Block Flooring 239
Dukes Stone 192
Dumfries Stone 192
Dunmore Stone .. .. .. 204 to 206
Dunmore Stone, Experiments on .. 110
Dutch Clinkers 174, 176
Dynamos 345, 349, 361

E.

PAGE
Early English Mouldings 74
Earth Closets 284
—— Natural Slope of 35
—— &c., Number of Cubic Feet to 1 Ton 36
———— Weight of 35
Eaves Tiles 270
Edging, Garden 180, 181
Elbows, Wood 242
Electric Batteries 346, 360
——— Bells 300, 360
——— Cables 351
——— Ceiling Connections 354
——— Distribution Board .. 351, 354
——— Indicators 360
——— Insulation 343, 352, 353
——— Joints 343, 352, 364
——— Lamp Leads 353
———— Sockets 352
——— Lamps 350
——— Light, Specifications for 347 to 354
——— Lighting, Engines for .. 348
———— Estimate for .. 351
———— Maintenance of Work 346
——— Plant, Cost of 341, 355
——— Pulls 360
——— Pushes 360
——— Switch Board 349
——— Switches 344, 350, 352, 354, 357
——— Transformers 346
——— Wire Casing 246
Electrical Fittings .. 341, 359 to 361
Elbows, Iron-pipe 290, 293
Embankments, Dressing and Soiling Slopes of 156
Embossed Glass 312
Employers' Liability Act, 1880 373 to 375
Enamelled Bricks, Price of 183
———— Glass 320
Encaustic Tiles 174
Engines 348
——— Oil, Cost of Working 334, 335
——— Pumping 333
English Architecture, Nomenclature of 76
English Bond 16
——— Cathedrals, Dimensions of 30
Engraving 330
Espagnolette Bolts 251, 255
Evaporation from Water Surfaces 35
Excavator 64
Excavators' Memoranda 35, 36
———— Prices .. .. 155 to 159
———— Work, Prices per Cubic Yard 155
PAGE
Expansion of Materials by Heat .. 59
Experiments on Bricks 110
———— Corsham Stone .. 109
———— Corsehill Stone .. 108
———— Dunmore Stone .. 109
———— Girders 52
———— Maninghen Stone 109
———— Plean Stone 110
———— Polmaise Stone .. 110

F.

Facias, Wood 246
Facing Bricks 172
Faience 218
Fanlight Openers 256, 257*
Fanlights, Wood 240
Farleigh Down Stone 190
Fasteners, Sash 251, 255
Fees, Architects' .. .. .. 8 to 12
—— Surveyors' 113, 114
Feet and Inches and their Equivalent Links 372
Felts, Roofing 224, 259
Fencing, Oak 230, 233
——— Wood, Steam-made 248
Ferrule, Driving 280, 282
Fibrous Asphalte 224
———— Slabs 224
Field Gates 233
Filleting, Lime and Hair 172
Fillets, Tilting 235
Filling into Barrows, Price of .. 155
———— Carts 155
Fir 234
—— Columns, Strength of 81
—— Labour on 234
Fire Bricks, Price of 176, 179
—— Clay, Ground 179
———— Flue Base 175
—— Hose 327
—— and Insurance, Memoranda of 36 to 37
—— Lumps, Tiles and Slabs, Stourbridge 177, 183, 184
—— Rules and Regulations for prevention of .. .. 342 to 347
Fireproof Bricks 183
——— Flooring 223, 258
——— Doors 389
——— Plastering 277
Fireproof Lavatory 287
——— Plumber 228
——— Stable 296, 326
Fittings, Bath 287
——— Casement .. .. .254 to 257
——— Deal School 249, 250
——— Electrical .. 341, 359 to 361
Five Orders of Architecture 38 to 45

PAGE
Fixed Lights, Iron 294
Flange Pipe, Iron, Fittings 295
Flat Bar Iron, Weight of a Lineal Foot 148
Flats, Tiled 267
—— Zinc in 299
Flatting Glass 309
Flax Line 251
Flemish Bond 16
Flint Walls 45
Flitch Guides, Rule to Calculate Strength of 52
—— Plates 289
Floors, Barn 237
—— Batten 237
———— Oak 238
—— Double 47
—— Dowelled 237
—— Fireproof 258
—— Labour on 236
—— Lights 314
—— Plaster 272
—— Single Joist 47
—— of Timber . .. .. 46 to 48
———— Formulæ for .. 46
—— Timber, Sketches of .. 47, 48
—— Warehouse 237
Flooring 233, 234, 237
——— Brads, Weight of 161
——— Fireproof 223, 258
——— Hungarian Oak Batten .. 238
——— Memoranda of 17
——— Parquet, London made .. 238
———— Solid 238
———— Veneered 238
——— Pine 225
——— Slate 263, 265
——— Tiles 269, 270
——— Wood-block 239
———— Geary's.. .. 250
Flow of Water in Sewers 34
Flue Base, Fire Clay 175
Flue Covers 179
—— Pipe 158, 178
Flush Rings, Brass 251
Fluted Sheet Glass 312
Foreign Measures compared with English 370
Forms.. 250
Footings to Walls 48
Footway, Paving 160
Foundations, Planking and Strutting to 235
Founder .. .. 289 to 297
Fourth Root, to find 118
Framed Partitions 245
Frames, Door 244
Frames, Window 244
——— Wood.. 241
———— Steam made 247
PAGE
French Building Stone 220
——— Polishing 246, 303
——— Tiles 175
Friction of long pipes (Box's formula) 142
Friezes, Plaster 272
Funnel Pipes 279
Furnace Bars, Weight of 94
——— Ironwork 295
——— Pans, Iron 295
Furniture, Door .. .. 252 to 255

G.

GALVANIZED Iron 291
———— Cisterns ..291, 340*
———— Coping Cramps . 216
———— Furnace Pans .. 295
———— Pipe 294
———— Tile Nails.. 268
———— Wire Netting 328
Garden Edging.. .. .. .. 180, 181
Gas 49
—— Fitters' Memoranda .. 48, 49
—— Fittings 298
—— Meters 298
—— Pipes 298
—— Supply, Memoranda and Table of 49, 50
—— Tubing, Weight of.. 49
Gates, Oak Field 233
Gatherley Moor Stone 192
Gauge, Birmingham Wire 154
——— of Zinc 155
Gauged Arches.. 174
Gauging Plaster 272
Gault Bricks 177, 178
Giffnock Stone .. .. .. 204 to 206
Girders .. .. 50 to 59
——— and Joists, Rolled-iron, Table of Safe Load 54
———— Rolled Iron, Section of 55
——— Bolt-holes in 289
——— Box 289
——— Cast-iron 290
——— Compound Riveted 289
——— Experiments on 52
——— of Wood, with Wrought-iron Flitches 52
——— of Wrought iron, Strength of 53
——— Riveted 289
——— Rolled Iron.. 289
——— Steel Box 289
——— Steel Plate 289
——— Strength of Wood 50
——— Table of 52, 53
——— Trussed 51
Gilding 303
Glass Bending 312, 319

PAGE

Glass Crown, usual Thickness .. 309
—— Embossed 312
—— Enamelled 320
—— Extreme Sizes of 309
—— Faced Bricks 184
—— Flatting 309
—— Fluted Rolled Rough Plate .. 319
—— Fluted Sheet 312
—— Grinding 312, 315, 316
—— Hartley's Patent 317
—— Medieval 320
—— Muranese 320
—— Obscuring 309, 312
—— Plain Rough Rolled Plate .. 318
—— Plate .. .. .. 313 to 317
—— Polishing 309, 312
—— Re-polishing 315
—— Sheet .. .. .. 310 to 312
—— Slates 318
—— Tiles 267, 268, 317
—— Translucent 320
—— Venetian 320
—— Ventilators 317
Glasshouse Blocks 179
Glazier .. .. .. 71, 309 to 320
Glazed Bricks 183, 393
Glazing, Patent 320
Gold Size 304
Graining 302
Granite .. .. 218 to 220
——— Belgian 219
——— Bricks 183
——— Broken 221
——— Columns 219, 220
——— Cornish 218
——— Imitations 301
——— Kit Hill 220
——— Paving 160
——— Tamar 220
——— ——— Aberdeen 221
Granites, Strength of 107
Granitic Stone Paving 165
Granolithic Stone Paving .. 223, 258
Grating, Ventilating 296
Gratings, Area 290
Gravel 221
——— Digging 155
——— No. of Cubic Feet to 1 ton .. 36
——— Planks 230
——— Roads 160
Greek and Roman Orders, Comparisons of 45
——— Doric Order 44*
Green Sandstone 192
Greenhouses, Wood, Steam made .. 248
Grey Rock Stone 204
Grimshill Stone 192
Grinding Glass 312, 315, 316
Groins, Brick 172
Ground, Fire Clay 179

PAGE

Ground Skirting 240
Gullies 158
——— Traps 158
Gutters 236
——— Brackets, Iron 290
——— Iron 290
——— Stable, Iron 296
——— Zinc 299
Gypsum 276

H.

Hair 176
—— Plasterer's 276
Halls, Public, Dimensions of .. 31
Ham Hill Stone 193
Handrails, Wood 246
Hardness of Water 140, 141
Harness Brackets, Iron 296
——— Pegs 247
——— Room Fittings, Wood .. 247
——— ——— Iron .. 296
Hartley's Patent Glass 317
Hartwith Stone 193
Hawksley's Patent Stair Treads .. 237
Haydor Stone 193
Hay Racks, Iron 296
Hayshaw Moor Stone 193
Hearth Stones, Slate 265
Heat, Expansion of Lead by .. 59, 83
—— Memoranda of Conducting Powers and Expansion by .. 58, 59
Heating, Cost of 58
——— by Hot Water 138
——— by Radiators 138
——— by Steam 137, 295
Heights, Inaccessible, to Find 60, 61
Hemp Ropes, Strength of 59
Herringbone Strutting, Labour on, Price of 236
Hermand Stone 209, 210
Hinges 251, 254
——— Coach House Door 296
Hip Hooks 267
—— Rolls 236
—— Tiles 181, 268, 270
——— Quoined 269
Hips, Slate 259
Hire of Builders' Plant 337, 338
Hitchin's Fireproof Plaster 277
Hobman's Tar Paving 221
Hollington Stone 193
Hollow Columns, Strength of .. 23
Honduras Mahogany 235
Hooks, Hip 267
Hoop Iron Bond 16, 172, 289
——— ——— Memoranda of 60

PAGE

Hoop Iron, Weight in lbs. per Foot Run 60, 147, 148
Hoppers, Lead 281
——— Wrought Iron 294
Hopton Wood Stone 193, 194
Horns, Sash 241
Horse Pots, Iron 296
Hose, Steam 336
—— Fire.. 327
——— Warming by 138
Hot Water Tanks 340*
House-bells 300
Housings 245
Hungarian Oak Batten and Solid Parquet Floors 238
Hydraulic Cement 19
——— Limestones 63
——— Mortar 72
——— Pumps 281
——— Rams 391

I.

Ice, Strength of 60
Imitation Marbles, Painting 302
Imitations.. 302
Inaccessible Heights, to find .. 60, 61
Incandescent Lamp Fittings.. .. 358
Indents, Brick 172
Indicators 359
Instruments, Drawing .. 330 to 332
Insulation 343, 352, 353
Insurance, Fire.. 36
Intercepting Traps 286
Intercolumniations 45
Ionic Order .. .. 41 to 43
Irish Marbles 213, 214
Iron, Angle and T, Table of.. 144, 145
—— Balusters 291
—— Casements and Frames 291 to 293*
—— Cast, Strength of Girders .. 53
—— Castings 290
—— Cisterns 291
——— Galvanized 340*
—— Columns 290
—— Coping Cramps 216
—— Corrugated 28, 291
—— Doors and Frames 290, 297, 329, 389
—— Drain Pots 296
—— Fixed Lights .. .. .292 to 294
—— Flange Pipe Fittings 295
—— Flat Bar, Weight of a Lineal Foot in Lbs. 148
—— Furnace Pans 295
—— Galvanized 291
—— Girders 289, 290
—— Gutters, Stable 296

PAGE

Iron Harness Brackets 296
——— Room Fittings.. .. 296
—— Hoppers 294
—— Hoop, Memoranda of 60
——— Weight of 147, 148
—— Joists, Rolled, Table of.. .. 87
—— Lift Pumps 281
—— Mangers 291
—— Pipes.. 286, 290, 293†, 294, 295
—— Pipe Elbows .. ..293†
——— Fittings .. ..293†
——— Galvanized 293
——— Tees 294
——— Unions .. ..293†
—— Plates 289
—— Rails.. 289
—— Roofs, Examples of .. 61, 62
—— Sashes 297
——— and Frames 290, 296
—— Scrap.. 291
—— Screws 251
—— Sheet, Weight of 149
—— Socket Pipe 295
—— Spanners .. ..293†
—— Stable Fittings.. .. .. 296, 297
—— Staircases 295, 297
—— Standards 290
—— Steps 295
—— Test of 62
—— Tubes, &c. .. ..293†
—— Weight of Wrought 143
—— Windows and Frames 294
—— Wrought 53
——— Strength of Girders 295
Ironmonger .. .. .. 251 to 285
Ironwork, Furnace 295
Isle of Sheppey Cement.. 274

J.

Jackdaw Crag Stone 194
Jamb Linings, Steam Made .. 245, 248
Johnson's Fireproof Partitions .. 277
Joiner.. .. .. 69, 70
Joinery, Steam Made .. 247 to 250
Joints of Beams 93
—— Electric 343, 352, 364
Joists 62
—— Binding and Single 46
—— Ceiling 46, 47
——— Labour on.. 236
—— Formula for 46
—— Steel Riveted, Table of Safe Loads 57
—— Steel Rolled 289
—— Table of Rolled Iron 87
——— Scantlings 47

K.

PAGE

Keen's Cement 276, 277
Kentish Rag 189, 194
——— Ragstone, Memoranda of 62
Kerbing, Relaying, Price of 160
Ketton Stone 194
Kilkenny Marble 213
King Post, Strength of 87
King Post, Table of 92
——— Truss 88
Kitchen Sinks 284
Kit Hill Granite 220
Knobs, Brass 251
Knotting 77
Kyanizing 84

L.

Labour on Fir 234
——— Marble 215, 216
——— Stone . . . . 185 to 187
——— Timber 229, 230
Ladder Staves, Oak 230
Ladders 338
Laminated Lead 306
Lamp Leads 357
—— Sockets 352
Lamps 350
—— Arc 345
—— Incandescent 352
Land, Table of Drainage of 31
Landings, York Stone 160
Large Contracts, Note on 155
Lascelles' Patent Concrete Slabs . . 163
Latches 252
Laths 81, 82
—— Blind 234
—— Crate 234
—— Hand-made 234
—— Plasterer's 276
——— Oak 230
—— and Plastering 271, 272
—— Slating 234
—— Trellis 234
—— Tiling 260
——— Oak 230
Lathing, Metal 258, 277
——— Wire 277
Lathwood 225
Lathwork 277
Lavatory Fittings 287
Lead 279
—— to Detect, in Water 63
—— Drawn 279
—— Expansion of, by Heat . . 59, 83
—— Hoppers 281
—— Laminated 306
—— Lights 317
—— Milled 279
Lead, Moulded 281
—— Pipes 63
——— Thickness of 83
——— Weight of 83, 150
—— Safes 281
—— Thickness of 82
—— Weight of Feet Super 144
—— White 247, 304
Lear Boards 236
Leather Paper 307
Levelling Trenches for Concrete . . 156
Lifts 328, 390, 391
Light, to find the Area required to Illuminate a Room 63
Lighting, Central Station 356
Lightning Conductors . . 63, 363 to 365
Lights, Ancient . . . . . 2 to 5
——— Fixed Iron . . . . 292 to 294
——— Floor 314
——— Lead 317
——— Pavement 314
——— Iron 291
——— Stall Board 324
Lime 178, 276
Lime, Blue Lias 176
—— Chalk 176
—— and Hair Filleting 172
—— Selenitic 64, 277
—— Stone 176
Limestones 63, 100, 106
——— Strength of 107
Limewhite 275, 276
Line, Flax 251
Lincrusta-Walton 306, 307
Linings, Back 241
——— Jamb 245
Lining Paper 306
Line, Sash 247
Linings, Wall 245
Links, Feet and Inches, and their Equivalents 372
Linseed Oil 276
Lintels 234, 389
——— Fir 235
——— over Openings 64
——— Wood 64
Loads on Piers 79
——— on Piles 80
——— on Roofs 64
Locks . . . . . 251 to 253, 257†
—— Fixing 247
London Building Act, 1894 376 to 383
——— Vestry Rates, Examples of 160
——— Cost of Street Paving in . . 392
Long pipes, friction of (Box's formula) 142
Loose Box Doors 296, 297
——— Posts, Iron 296, 297
—— Boxes, Iron 296, 297

M.

PAGE

Magnesian Limestones 100
Mahogany 225
——— Casings 246
——— Facias 246
——— Honduras 235
——— Wainscot 235
Malt Kiln Tiles 182
Manger Blocks 182
Mangers, Iron 291
Manhole Covers 286
Maninghen Stone 109
Mansfield Stone 195
Marble .. .. 213 to 216
——— in Block 214
——— Columns 214
——— Devonshire 214
——— Imitation, Painting 302
——— in Slate 260
——— Paving 215
Marbles, Irish 213, 214
——— Kilkenny 213
——— Labour on.. .. .. .. 215, 216
——— Slabs 215
Margins, Mitred 237
Marl, Number of Cubic Feet to One Ton 36
Martin's Cement 273, 276
——— Directions for using 273
Masons' Memoranda 67
——— Prices .. .. .. 185 to 220
Masons' Time and Materials.. .. 216
Mastic 275, 276
Matchboards 233, 234
Matched-boarding 236
Materials, Carpenters' .. 233 to 236
——— Conducting Power of various 58
——— Prime Cost of.. 172 to 184
——— Strength of 110
——— Tenacity of 122
Medieval Glazing 320
Measure, Nautical 371
Measurement of Builders' Work 64 to 72
Measures of Timber.. 125
Memoranda, Carpenters' .. 16 to 19
Men and Animals, Weight of .. 372
Mensuration of Surfaces.. 64
Metallic Cement 276
Metal Lathing, "Jhilmil" 277
Metals, Sheet, Weight of, in lbs. per Square Foot 147
——— Weight of .. .. 143 to 152
——— per Cubic Foot 151
Meters, Gas 298
Metropolitan Sewers 33
Mica Valves 322
——— Ventilators 322

PAGE

Milled Lead 279
Miscellaneous 371
——— Articles, Weight of 152
Mitred Margins 237
Moore Stone 189
Mortars 72, 73, 176
——— Comparative Cost of.. .. 166
——— Comparative Strength of.. 73
——— Hydraulic 72
Mortars, Red 15
——— Required for Brickwork .. 14
——— Smeaton's 72
Mortise 18
——— Locks 252, 253
Mosaics 175
Mosaic Floors, Wood 238
Moulded Bricks 181
——— Brickwork 177
——— Lead 281
Mouldings.. .. .. 73 to 75
——— Cement 273, 274, 277
——— Decorated 75
——— Early English, Examples of 74
——— Faience 218
——— Norman, Examples of 74
——— Perpendicular, Examples of 75
——— Plaster 272, 278
——— Wood, Steam Made 246, 247
Moulds, Wax 276
Mullions, Bricks 177

N.

Nails, Copper 300
——— Pipe 280, 290
——— T 267
——— Tile, Galvanized 268
——— Weight of Copper 151
——— Slating 151
——— Zinc 299
Natural Slopes of Earths 35
Nautical Measure 371
Nelson's Portland Cement 278
Netting, Galvanized Wire 328
New Braidbar Stone .. 204 to 206
Night Soil, No. of Cubic Feet to 1 Ton 36
Nogging, Brick 13, 171
Nomenclature of English Architecture 76
Norman Mouldings 74
Norton's Abyssinian Tube Wells, Prices of 158
Note on Large Contracts 155
Nuts, Iron 289, 291
——— Size of 95
——— Weight of 150

O.

PAGE

Oak 226
—— Dantzig and Memel 225
—— English 226, 230
—— Fencing 230, 233
—— Field Gates 233
—— Gravel Planks 230, 233
—— Pales, Cleft 233
—— Scantling 234
—— Sills 234
—— Tiling Laths 230
Obscuring Glass 309, 312
Obscured Sheet Glass 312
Oil Engines 334
———— Cost of Working .. 335
— Gold Size 306
— Linseed 276
Old Giffnock Stone .. .. 204 to 206
Oolitic Stones 102
———— Weight of, and Labour on 106
One Ton, Quantity of Materials equal to 16, 36, 95
Orchard Stone .. .. .. 204 to 206
Ornamental Bricks 177
———— Roofing Tiles 269, 270, 271
Orders of Architecture .. .. 38 to 45
Overwood Stone .. .. 204 to 206
Ovolos, Brick 177
Ozonized Paint Dryer 304

P.

Painswick Stone 196
Paint, Anti-Corrosion .. 304 to 306
—— Manufacturers' Prices.. .. 304
Painter .. .. .. 72, 301 to 308
——— Cleaning and Sizing Old Work 303
——— Day Work 306
——— Graining 301
——— Ladder Work 301
——— Memoranda 77
——— Oil Gold Size 306
Painting, Flatting 301
——— Imitation Granite 301
——— Imitation Marbles 302
——— Reveals 301
——— Sash Frames 302
——— Skirtings 301
Paints, Proportion of Colours for Ordinary 304
Pales, Oak Cleft 230, 233
——— Sawn 230
Palings 234
——— Oak Park 234
Pantiling 267
Papernanger .. .. 72, 306 to 308
Paper, Leather.. 307
—— Lining 305
—— Willesden 307
Papers, Wall 307
Pargetting 176
Parian Cement 276
Park Spring Stone 263
Partitions, Framed 245
———— Johnson's Fireproof .. 277
———— Labour on 236
———— Wood 245
Parquet Flooring 238
———— Veneered 238
———— Solid 238
Patent Glazing 320
Patents, Designs and Trade Marks 384 to 386
Pavement Lights 314
———— Iron 291
———— Slate 263
Paving .. .. 187 to 189
—— Aberdeen Granite 221
—— Artificial Stone 222
—— Asphalte 224
—— Brick 13
—— Bricks, Adamantine 270
—— Bricks 174, 176, 180, 181, 182
—— to Footways.. 160
—— Granite 160, 221
—— Granitic Stone 165
—— Hobman's Tar 221
—— Portland Cement.. 274
—— Road 160
—— Silicated Stone 222
—— Stable 222, 223
—— Stone.. 187 to 189, 190, 193, 198 202, 204, 212
—— Street 160
—— —— Cost of, in London .. 392
—— Stuart's Granolithic Stone 223, 258
—— Tar 221, 222
—— Tiles 174, 175, 179
—— Wood, Notes on 223
Pavings, Notes on 222
Pavior, Time and Materials 221
Paviors' Memoranda .. 66, 77, 78
Pawton Slate 262, 263
Pebbles 221
Perspective, Memoranda of .. 78, 79
Pegs, Cloak, Wood 247
—— Harness 247
—— Tile 268
Perpendicular Mouldings 75
Petersburg Standard of Timber, Table Showing No. of Running Feet contained in 125
Piers, Safe Load on 79
Piggery Fittings 297
Pillars, Brick 81

PAGE
Pillars, Stone 80
—— Wood 81
Pilasters, Cement 274
Piles, Loads on.. 80
Pine 225, 226, 231, 232
Pipe Casing 246
—— Copper Tinned 294
—— Drains, Stoneware 159
—— Elbows, Iron 290
—— Fittings, Iron .. .. .. 293†
—— Flange, Cast-iron 295
—— Flue 158
—— Galvanized Iron 294
—— Heads, Iron 290
—— Iron 286
—— Nails 280, 290
—— Socket, Iron 295
—— Tees, Iron .. .. ..293†, 295
—— Unions .. .. 293†
Pipes, Cast-iron.. 290
———— Pressure in 141
———— Weight of, per Lineal Foot in lbs. 146
—— Copper 300
—— of Copper, Weight of in lbs. per Lineal Foot 147
—— Drain 176, 286
—— Funnel 279
—— Gas 298
—— Lead 63
—— Long, Friction of 142
—— Pressure in Cast-iron.. .. 141
———— Thickness of 83
———— Weight of 150
—— Rain Water 279, 280
—— Soldered 280
—— Water 141
—— Zinc 299
Pitch 247
—— Pine 226, 231
Place Bricks 176
Planing Timber 230
Planks 16, 231, 232
———— Distinguishing Brands on 126 to 129
—— Gravel 230
———— Table of Cubical Contents 17 to 19
Planking and Strutting to Foundations, Price of 235
Plant, Cost of Electric 341, 355
Plaster 275
—— Cornices 272, 278
—— Enrichments 272, 278
—— Floors 272
—— Gauging 272
—— Modellers', Day Work .. 275
—— Mouldings 272, 278
—— of Paris.. 276
—— Pugging 272
PAGE
Plaster, Rendering, Floating, and Setting 271
—— Soffits and Friezes 272
—— Stopping and Colouring, 274, 275
Plastering.. .. .. 71, 277
———— Fireproof 277
———— Lathing, Floating, and Setting 271, 272
———— Stucco 272
Plasterer .. .. 271 to 278
Plasterers' Day Work 275
———— Hair 276
———— Laths 276
———— Memoranda 81, 82
———— Moulds, Wax 276
———— Oak Laths 230
———— Putty 275
———— Time and Materials 275, 276
Plate Glass .. .. .. 313 to 317
———— Fluted, Rolled, Rough 319
———— Hartley's Patent.. .. 317
———— Plain Rolled Rough .. 318
Plates, Iron 289
—— Timber 234, 235
Plean Stone 207
———— Experiments on 110
Plotting Surveys 112
Plumber .. .. .. 70, 279 to 288
Plumbers' Fittings 282
———— Memoranda 82, 83
Pointing 83, 173, 176
———— Brickwork 14
Poles 234
Polishing 303
———— French 246
—— Glass.. .. .. .. 309, 312
Polmaise Stone 208
———— Experiments on .. 110
Portland Cement 20, 83, 84, 274, 276
———— Stone .. 185, 186, 196 to 198
———— Comparative Strength of 73
———— Nelson's 278
Pots, Chimney 175, 179
———— Stone .. .. .. 196 to 198
Pounds and Ounces, Decimal Equivalents of 371
Pozzolana 84
Preservation of Brick 84
———— Stone 84
———— Stone, Ransome's Process 85, 86
———— Wood 84, 85
Pressure in Cast Iron Pipes 141
———— Water Pipes.. 141
———— of Wind against Walls .. 153
Priming 77
Principal Rafters, Strength of .. 90
Property, Table for Purchasing Leases of 133, 134

PAGE

Property, Valuation of 132
Proportion of Increase of Earth, &c., when Dug 36
Public Buildings 382
Puddling 155
Pugging 272
Pulleys 339, 340
Pulsometers 336
Pumicing Walls 306
Pumps 281
——— Brass Well 281
——— Hydraulic 281
——— Iron Lift 281
Pumping Engine 333
——— Windmills .. .. .. .340*
Purbeck 187, 221
Purlins, Strength of 91
——— Table of Scantlings 92
Putlogs 230, 234
Putty 77, 304

Q.

Quarella Stone 202, 203
Quarter Partitions, Labour on .. 236
Queen Posts, Strength of 89
——— Post Truss 89
Quoins, Squint 172

R.

Racks, Iron Hay 296
Radiators 295
Rafters, Common, Strength of .. 91
——————— Scantlings of .. 92
——— Principal, Strength of .. 90
Rails, Iron 289
Rainfall per Annum 86
——— Removal of 32
Rain Water Pipe Heads, Iron .. 290
——————— Pipes, Iron 290
——————— Pipes 279, 280
Ramming to Walls 155
Ramps, Iron Ventilating 296
Rates, London Vestry, Examples of 160
Ravenscraig Stone, Price of 210
Recipe for Damp Walls 30, 84
Red Terra-cotta 217
Rendering in Cement 173
Retaining Walls 86
Reveals, Painting 301
Revolving Shutters 243
Ridges and Hips, Slates 259
Ridge Rolls 236
——— Tiles 178, 181, 261, 271
Rings, Brass Flush 251
Road Paving 160
Roads, Gravel 160
Roche Abbey Stone 198

PAGE

Rock, Cutting and Shearing 155
Rocks, &c., Weight of 35
Rolls, Hip and Ridge 236
Rolled Iron, Girders, and Joists, Section of 55
——————— Joists and Girders, Table of Safe Load 54
——————— Table of 87
Rollers, Towel 247
Roman Bricks 15
——— Cement 20, 274, 276
——— Mortar 15
——— Orders, Comparison of Greek and 45
Roofing, Asphalte 224
——— Felts 224, 259
——— Labour on 235
——— Slates 393
——— Tiles, Blue 270
——————— Broseley 269
——————— Hand-made 270
Roofs .. .. 87 to 92
——— Iron, Examples of .. 61, 62
——— Loads on 64
——— Wooden, Table of Scantlings 92
Rooms, Ventilation of 137
Root, Fourth, to find 118
——— Sixth, to find 118
Roots, Square .. .. .. .116 to 118
Ropes and Cords 339
——— Hemp, Strength of 59
Rough Arches 170
Round Bar Iron, Weight of in lbs. 149
Rubbers 178
Rubbish, Carting 221
Rules and Regulations for the Prevention of Fire .. .. 342 to 347
Rust, to Prevent 94

S.

Saddle Bars 320
——————— Wrought Iron 291
——— Brackets 247
Safes, Lead 281
——— Load on Piers, &c. 92
Safety Valves, for Kitchen and Heating Boilers 288
Sand 176, 276
——— Number of Cubic Feet to One Ton 36
Sandstone, Green 192
Sandstones 98
——————— Strength of 136
Sash Doors 244
——————— Steam Made 248
——— Fasteners 251
——————— Fixing 247
——— Fittings 254
——— Frames, Painting 302

PAGE

Sash Lever, Hinley's Patent 327
—— Line 247
—— Line, Patent Steel 255
—— Weights 247
Sashes Cast-iron 297
——— and Frames, Iron.. 296
——— Iron 296
——— Wood 241
——————— Steam Made 247
Sawing and Planing Timber 239
——— Timber 239
Scaffolding.. 239
——————— on Hire 338
Scantling of Common Rafters . 91, 92
Scantlings of Purlins, Table of .. 92
——————— Table of, for Tie-beam.. 92
——————— of Timber Roofs .. 87, 92
——— of Wood Floors 47
Scarf, Memoranda of 93
School Fittings, Deal 249, 250
Scotgate Ash Stone 198, 199
Scrap Iron.. 291
Screw-bolts, &c. 291
Screws, Boiler 281
——— Brass 251
——— Iron 251
Scrolls, Handrail 246
Sea Water 138
Seacombe Stone 198
Seats 250
Selenitic Lime 64, 277
——————— Concrete 277
Sewers, Cylindrical, Table of Quantity of Bricks and Digging in .. 142
——— and Drains .. .. .. 32 to 34
Sewer Flusher, Merryweather's .. 329
——— Flow of Water in. 34
Sewers, Metropolitan 33
Seyssel Asphalte 223
Shearing Rock 155
Sheet Copper 300
——— Glass .. .. .. 310 to 312
——— Iron, Weight of 149
——— Metals, Weight of a Square Foot in lbs. 147
——— Zinc, Malleable 299
Shingle, Number of Cubic Feet to One Ton 36
Shingles, Oak 230
Shoes, Iron 290
——————— Pipe 290
Shoe Valves 281
Shop Shutters 242
Shoring 93
Shutter-bar 251
Shutters, Boxing 242
——————— Revolving.. 243
——————— Shop 243
——————— Sliding 243
——————— Wood, Sliding 243

PAGE

Signs, Algebraic 2
Silicate Cotton 391
Silicated Stone 212
——— Stone Paving 222
Silk Cord 93
—— Flap Outlet Ventilators. 321
Sills, Oak 234
—— Slate 263, 265
Single Joist Floors 47
Sinks 178, 187, 222
——— Kitchen 284
——— Slate.. 260
——— Slop 284
Sink-trap 327
Sixth Rest, to find 118
Size 276
—— of Bricks 12
—— Oil Gold 305
—— Gold 304
Skirting, Asphalte 224
——————— Cement, Martin's 273
——————— Grounds 240
——————— Painting 301
——————— Slate 265
——————— Wood.. 240
——————— Wood, Steam Made.. .. 247
Skylight Openers 256, 257
Skylights 299
——— Wood.. 240
Slab Slate 260, 265, 266
Slabs for Building, Concrete, ... 163
—— Marble 215
Slag, Concrete 163, 164
Slate Baths 261
—— Blue, Machine Dressed 263, 264, 265
—— Chimney-pieces 261
—— Cisterns 260, 266
—— Columns 261
—— Enamelled 260
—— Flooring 263, 265
—— Green, Queen Anne 266
——————— Westmoreland 265
—— Hearthstones 265
—— Labour on 260
—— Number of Feet in a Ton of 266
—— Pavement.. 262
—— Pawton 262, 263
—— Ridges and Hips 250
—— Roofing 393
—— Sinks 260
—— Skirtings 265
—— Slabs 260, 265, 266
—— Sills 263, 265
—— Urinals 261
Slater .. .. 259 to 266
—— Materials 266
—— Memoranda 94
—— and Tilers' Memoranda .. 67
Slater's Time and Materials 266
Slates, Eureka Green 261

PAGE

Slates, Glass 318
——— Permanent Green 262
——— Silver Grey 263
——— Weight of 94
——— Whitland Abbey .. 261, 262
Slating Laths 234
Slating Nails, Weight of 151
——— Open or Half 259
——— Roofs 259
——— Stripped and Relaid 259
Sliding Door Gear 329
——— Shutters 243
Slop Sinks 284
Smeaton's Mortar 72
Smith and Founder .. ..70, 289 to 297
Smith's Memoranda 94, 95
Smoky Chimneys, Cause and Cure of 21, 22
Soap Powder 304
Socket Pipe, Iron 295
Soffits, Plaster 272
——— Wood 242
Solder 279
Soldered Pipes 280
Solid Cylinders, Strength of 23
Soil Traps, Lead 281
Sound Boarding 237
——— Velocity of 95, 136
Spanish Brickwork 15
Spanners, Iron .. ..293†
Speaking Tubes 327
Specifications for Electric Light 347 to 354
Spikes, Weight of 151
Splays, Brick 172, 177
Springs, Door .251, 252, 254, 257ª, 257†
Spruce 225, 232
Square Bar Iron, Weight of per Lineal Foot 149
——— Roots .. .. .. 116 to 118
Squares, Table of .. .. 116 to 118
Squint Quoins 172
Stable Bricks 180, 181, 182
——————— Chamfered 179
——— Fittings 296, 326
——————— Iron 296
——— Gutters, Iron 296
——— Paving 223
——————— Bricks 296
Staffordshire Blue Bricks and Tiles 181, 182
——————— Bricks and Tiles 181 to 184
Stainton Stone 198
Stairs, Memoranda of 95
Stair Treads 237
Staircases 245
——————— Circular Iron 297
——————— Iron 297
Stall Board Lights 324
Stall Divisions, Iron 296

PAGE

Stalls, Iron 296
Stanchions, Table of Breaking and Safe Loads .. .. 25 to 27
Stancliffe Stone 198
Standards, Cast Iron 290
——— Deal, Table of Cubical Contents .. .. 17 to 19
Stay, Bolt and, Combined 254
Stays, Casement 251, 255
Steam, Heating by 137
——— Hose and Fittings 336
——— made Joinery .. 247 to 250
——— ——— Wood Fencing 248
——— Supply 351
——— Warming by 137
Steps 338
——— Iron 295
Steel Box Girders 289
——— Plate Girders 289
——— Rolled Joists 289, 387, 388
——— Riveted Girders and Joists, Table of Safe Loads 57
Stock Bricks 181
Stoke Ground Stone 190
Stone .. .. 185 to 212
——— Abercarne 189
——— Ancaster 189
——— Analysis of Bath 189
——— Ayrshire 189
——— Aubigny 189
——— Bath 185, 186, 190, 191
——— ——— Analysis of 189
——— Beer 191
——— Bethel 190
——— Berwig 191
——— Blair 200, 203
——— Blue Lias 196
——— Box Ground 190, 191
——— Building, Strength of 108 to 110
——— Caen 185, 186, 191
——— Campden 191
——— Casterton 192
——— Chapelhall 212
——— Chilmark 192
——— Clipsham 199, 200
——— Columns 205
——— Combe Down 190
——— Corngrit 190
——— Corsehill 192
——— Corsham Down 190, 191
——— Craigleith 189, 212
——— Dukes 192
——— Dumfries 192
——— Dunmore .. .. .. 204 to 206
——— Doulting, Labour on 192
——— Farleigh Down 190
——— French Building 220
——— Gatherley Moor 192
——— Giffnock .. .. .. 204 to 206
——— Green Sandstone 192

PAGE
Stone, Grey Rock 204
—— Grimshill 192
—— Ham Hill 193
—— Hartwith 193
—— Haydor 193
—— Hayshaw Moor 193
—— Hermand 209, 210
—— Hollington 193
—— Homan's Silicated 212
—— Hopton Wood 193, 194
—— Jackdaw Crag 194
—— Kentish Rag 189, 194
—— Ketton 194
—— Labour on .. .. 185 to 187
—— Lime 176
—— Liquid, Szerelmey 216
—— Mansfield 195
—— Maninghen 109
—— Moore 189
—— New Braidbar .. 204 to 206
—— Notes on Bedding.. 190
—— Old Giffneck .. .. 204 to 206
—— Orchard .. .. .. 204 to 206
—— Overwood .. .. 204 to 206
—— Painswick 196
—— Park Spring 203
—— Patent Victoria 222
—— Paving, 187 to 189, 190, 193, 198, 202, 204, 212
———— Silicated 222
———— Stuart's Granolithic 223
—— Pillars 80
—— Plean 207
—— Polmaise 208
—— Portland.. 185, 186, 196 to 198
—— Preservation of 84
———— Ransome's Process 85, 86
—— Purbeck 187
—— Quantity equal to 1 Ton .. 95
—— Quarella.. .. .. .. 202, 203
—— Ravenscraig 210
—— Robin Hood and Howley Park 304
—— Roche Abbey 198
—— Scotgate Ash.. .. .. 198, 199
—— Seacombe 198
—— Stainton 198
—— Stancliffe 198
—— Stoke Ground 190
—— Totternhoe, Notes on 201
—— Wall, Thickness of 376
—— Walling 195
—— Wardour 192, 198
—— Weldon 189
—— Westwood Ground 190
—— Whitsome-Newton 211
—— Wild Carr 201
—— Winsley Ground 190
—— Yorkshire .. 186 to 188, 201
Stones, Absorbent Powers of.. .. 1

PAGE
Stones, Building, Memoranda of (Memoranda of Quarries, Component parts of Stone, Colour, Price, &c., and where used) 95 to 109
—— Experiments on.. 108 to 110
Stoneware Articles 158
Stoneware Pipe Drains 159
Stopping and Washing Plaster, Colouring 274, 275
St. Pancras Co.'s Stable Fittings .. 296
Storage Cells 349
Stourbridge Fire Lumps, Tiles and Slabs 183, 184
Straining Beam, Strength of .. 90
———— Table of Scantlings 92
Straps and Ties, Wrought Iron .. 291
Street Paving 160
———— Cost of, in London.. 392
Strength of Braces 90
———— Bricks 110
———— Brickwork 14
———— Cement.. 20
———— Common Rafters .. 91
———— Fir Columns 81
———— Granites 107
———— Ice 60
———— Materials 110
———— Principal Rafters .. 90
———— Purlins 91
———— Queen Post 89
———— King Post 87
———— Ropes 59
———— Stone .. .. 108 to 110
———— Straining Beam 90
———— Struts 90
———— Tie Beam 89, 91
———— Timber.. 17
String, Terra-cotta 178
Strings, Wall, Wood 245
Struts, Strength of 90
——— Table of 92
——— of Wrought Iron 111
Strutting to Foundations 235
———— Herring-bone, Labour on 236
Stuart's Granolithic Stone Paving 223
Stucco.. .. .. 272, 273, 275
Sun-dials 391
Supply of Gas 49, 50
——— Water 138, 350
Surface Digging 155
Surface Gutters, Stable 296
Surfaces, Mensuration of 64
Surveying 112
Surveyors' Fees for Compensation Claims 113, 114
Switches, Electric Light. 344, 350, 352, 354, 357
Symbolism 114, 115

PAGE
Synoptical Table of Dimensions of Cathedrals 30
Szerelmey Stone Liquid.. 216

T.

T Iron, Table of Weights .. . 145
——— Weight of 144
T Nails 267
Table of Ancient Lights 3
——— Approximate Cost of Buildings 5, 6
——— Area of Circles .. 119 to 121
——— Breaking and Safe Loads of Cast-iron Stancheons .. 25 to 27
——— Brickwork per Foot.. .. 166
——— Cast Iron Girders 53
——— Circumference of Circles 119 to 121
——— Drainage of Land 31
—— for Purchasing Leases 133, 134
—— of Girders 52, 59
—— of Quantity of Bricks and Digging in Wells 142
——— and Digging in Sewers 142
——— Rolled Iron Joists 87
——— Safe Load for Rolled Iron Girders, &c. 54, 56
——— Steel Riveted Girders and Joists 57
——— Scantlings for Purlins .. 92
——— Tie-beams 92
——— Wooden Roofs 92
——— Squares, Cubes, Square Roots, and Cubic Roots .. 116 to 118
——— Struts 92
——— Thickness for Crowns of Arches 8
——— of Zinc 154
——— Transverse Strength of Timber 130
——— Trussed Girders 51
——— Value of Brickwork, 1 to 272 feet 169
——— Value of Brickwork per Rod.. 167
——— Weight of Angle and T Iron.. 145
——— per Superficial Foot of Various Metals 144
——— Wood Joists 47
Tacks, Copper 300
Tamar Granite 220
Tanks, Automatic Flushing 286
——— Hot Water 349*
Taps, Automatic Air Escape.. .. 282
Tar 247
—— Paving, Hobman's 222
Tar paving 160, 221, 222
Teak 225
Tees, Iron Flange-pipe 295
—— Iron Pipe .. .. 293†
Telephones 360
Tempered Clay.. 155
Tenacity of Materials 122
Tenon.. 18
Terra Cotta 178, 217
——— Copings 178
——— Diaper 178
Terra Cotta Flue Pipes 178
Terro-metallic Bricks 176
——— Ridge Tiles 269
Tesseræ 174
Testing Apparatus, Electric 349
Tests of Iron 62
Thames Ballast, No. of Cubic Feet to a Ton.. 36
Thickness of Cross Walls 381
——— Lead 82
——— Pipes 83
——— Stone Walls 376
——— Walls in Churches .. 22
——— Dwelling-house 378, 379
——— Warehouses 380, 381
Tie-beam, Strength of 89, 90
——— Table of Scantling .. 92
Ties, Wrought-iron Straps, &c. .. 291
Tile Coping in Cement 173
—— Creasing 172
—— Heads 267
—— Nails, Galvanized 268
—— Pegs 268
Tiled Flats 267
Tiler .. .. 267 to 271
—— Cutting 267
—— Materials 267
Tilers' Memoranda 67, 122
Tiles, Blue Roofing.. .. .. 268, 269
—— Broomhall 267, 268
—— Corrugated 217
—— Eaves.. 270
—— Edwards's Roofing 268
—— Encaustic 174
—— Faience 218
—— Fire 177
—— Flooring 269, 270
—— French 175
—— Glass 267, 268, 317
—— Hip 181, 268, 270
——— Quoined 269
—— Hollow 179
—— Malt Kiln.. 182
—— Number of, in 100 Feet Superficial 269
—— Paving 174, 175, 179
—— Ridge.. .. .. 178, 181, 261, 269

PAGE
Tiles, Ridge, Blue 268
——— Grooved 271
——— Ornamental 271
——— Terro-metallic 269
——— Ventilating 271
——— Weaving Shed 271
—— Roofing, Blue 270
——— Broseley 269
——— Hand-made 270
——— Ornamental 269, 270, 271
——— Pressed 270
—— Shropshire Roofing 269
—— Staffordshire 270, 271
—— Tile-and-half 270
—— Valley 181, 269, 270
—— Wall 174
—— Weight of 122
Tiling, Flats 267
——— Hips and Ridges 267
——— Irregular 267
——— Laths 267
——— Pantiling 267
——— Plain 267
——— Pointing 267
——— Stripping 267
——— Valley 267
——— Weather 267
Tilting Fillets 235
Timber, best for Various Uses 123, 124
——— Cubical Contents of, in Floors, &c. 29
——— Decay of 30
——— Distinguishing Brands on 126 to 129
——— Floors .. .. 46 to 48
——— Sketches of .. 47, 48
——— Table of Scantlings 47
——— Weight to be carried by 48
——— per Foot 227, 228
——— the Hardest 124
——— Labour on 229, 230
——— Marks on, Planks, Deals, and Battens 129, 130
——— Measurement of, in Trees 125
——— Measures of 125
——— Memoranda of .. 123 to 130
——— No. of Cubic Feet in a Petersburg Standard 125
——— Planing 230
——— Plates 234, 235
——— Roofs, Scantlings of .. 87, 92
——— Safe Lead on 48
——— Sawing 229
——— ——— and Planing 230
——— Strength of 17
——— Table Showing No. of Running Feet Contained in a Petersburg Standard 125
PAGE
Timber, Table of Price of Scantlings 18
——— Transverse Strength of 130
——— Weight of 124
——— Wholesale .. .. 225 to 232
Tin, Block 279
Tinned Copper Pipe 294
Totternhoe Stone, Notes on 201
Towel Rollers and Brackets 247
Towns, Cost of Drainage 34
Trade Marks and Patents 384 to 386
Traps 158, 280, 281
—— Bell 280, 290
—— D 281
——— Drawn Lead 285
——— Gully 158
——— Intercepting 286
——— Sink 327
——— Lead Soil 281
—— W.C. 158
Treads and Risers 245
Trellis Laths 234
——— Work, Steam-made 248
——— Work 234
Trenches, Filling in with Brick-bats 156
——— Levelling for Concrete .. 156
——— Ramming for Concrete .. 156
Trees, Measurement of Timber in 125
Trestles, Painters' and Builders' .. 338
Triangles, Memoranda of .. 131, 132
Trigonometrical Expressions .. 132
Troughs, Water 296
Truss, King Post 88
——— Queen Post 89
Trussed Girders 51
Tube Wells .. ..157, 340†
——— Norton's Abyssinian 158
Tubes, Boring 157
——— Speaking 327
——— Square 179
——— Wrought Iron .. .. 293†
Tubing, Brass 300
——— Copper 300
——— Gas, Weight of 49
——— Iron .. .. 293†
——— Zinc 300
Turnstiles 327
Tuscan Order 38, 39

U.

Union Joints, Lead 282
Unions, Pipe .. .. 293†
Urinals 287
——— Slate 261

PAGE

V.

Valley Tiles 182
Valuation of Property 131
——— Cost of Buildings.. 136
——— Table of Calculations for Purchasing Building Land According to the Lancashire System 136
——— Table of Reversions in Fee in Purchasing Ground Rents 134, 135
——— Table for Purchasing Leases 133, 134
Valves 281, 282
——— Bib 282
——— Diaphragm Screw 282
——— Mica 322
——— Safety, for Kitchen and Heating Boilers 288
——— Shoe 281
——— Spindle.. 281
Varnishes 304
Varnishing 303
Various Metals, Weight of 143
Velocity of Sound 95, 136
Veneered Parquet Flooring 238
Venetian Blinds 241, 332
Ventilating Grating, Iron 296
——— Ramps, Iron 296
——— Ridge Tiles 271
Ventilation of Drains 137
——— Memoranda of 136
——— of Rooms 137
Ventilators .. .. 286, 321 to 325
——— Blackman's Fan 323
——— Glass 317
——— Hayward's 321, 322
——— Mica 322
——— Silk Flap, Outlet.. .. 321
Verandahs, Zinc 299
Vestry Rates, Examples of London 160
Victoria Stone 222
Vitrified Granite Bricks.. 183
Vulcan Cement 304

W.

Wainscot Mahogany 235
Wall Linings 245
——— Papers 307
——— Plates 234, 235
——— String, Wood 245
——— Tiles.. 174
Walls, Anti-Corrosion Paint for Damp .. .. 304 to 306
——— Damp, Recipe for .. 30, 84
——— Filling in to 155
——— Flint 45
——— Footings to 48

PAGE

Walls, Pressure of Wind Against 153
——— Pumicing 306
——— Ramming to 155
——— Retaining 86
——— Thickness of in Churches.. 22
——— Thickness of Cross 381
——— for Dwelling House 378, 379
——— Stone 376
——— for Warehouses 380, 381
Waller, Memoranda of 67
Walling, Concrete 162, 163
——— Stone.. 195
Walnut 225
Wardour Stone 192, 198
Warehouse Floors 237
Warehouses, Thickness of Walls 380, 381
Warming by Hot Water 138
——— Steam 137
Washers 282
——— Brass.. 281
——— Iron 289
——— Size of 95
Washing Coppers 300
——— Plaster, Colouring, Stopping, &c. 274, 275
Water-closets 245, 283, 284
Water-closet Traps.. 158
——— Pans 158
——— Balls, Copper 281
——— Bars 257*
——— to Detect Lead in 63
——— Delivery of, in Pipes 141
——— Hardness of 140, 141
——— Hot, Warming by 138
——— Memoranda of .. 138 to 142
——— Pipes 141
——— Pressure in 141
——— Saving Arrangements, Automatic 328
——— Sea.. 138
——— Supply 138, 350
——— Domestic 333 to 336
——— Surfaces, Evaporation from 66
——— Tanks, Hot 340*
——— Troughs 295
——— Waste Preventers 283
——— from Wells, Power required to raise 142
Waterproofing, Composition for Brickwork 173
——— Composition for Stone 216
Waterworks 139, 140
Wax Moulds 276
Weather Boarding 237
——— Bars, Iron 252
——— Tiling 267
Weight Floors have to Carry .. 48

PAGE
Weight of Angle and T Iron.. .. 144
——— Bells 146
——— Brass, Foot Super. .. 144
——— Bricks 12
——— Brickwork 15
——— Cast-iron Balls and Solid Cylinders in lbs. 144
——— Pipes 146
——— Chains 150
——— Coppers 151
——— Copper Pipes in lb. per Lineal Foot 147
——— Foot Super. .. 144
——— Nails.. 151
——— Corrugated Iron .. 28, 29
——— Earth, Rocks, &c... .. 35
——— Flooring Brads 151
——— Furnace Bars.. 94
——— Gas Tubing 49
——— Hoop Iron in lb. Per Foot Run 60, 147, 148
——— Lead, Foot Super... .. 144
——— Pipes per Lineal Foot 83, 150
——— a Lineal Foot of Round, Flat, Square, and Bar Iron 148, 149
——— Men and Animals.. .. 372
——— Metals .. .. 143 to 152
——— per Cubic Foot 151
——— Miscellaneous Articles 152
——— Nuts and Bolt-heads in lbs... 150
——— Quality and Strength of Cement 20
——— Rolled Iron Joists and Girders 54
——— Sheet Iron 149
——— Slates 94
——— Slating Nails.. 151
——— Spikes 151
——— a Square Foot of Sheet Metals in lb... .. ..
——— Tiles 147
——— Wrought Iron 122
——— Zinc 154
——— to be carried by Timber Floors 48
Weights and Measures .. 368 to 372
——— Act 367
——— Sash 247
——— of Timber.. 124
Well Pumps 281
Wells.. .. .. .. 65, 142, 143, 156
—— Artesian Tube 157
—— Borings for 157
—— Norton's Abyssinian Tube.. 158
—— Notes on.. 156
—— Power Required to raise Water from 143
Wells, Tube .. ..340†
Weldon Stone, Analysis of 189
—— Table of Quantity of Bricks and Digging in 142
Westmoreland Green Slates 265
Westwood Ground Stone 190
Wheeling Barrows 155
White Lead 247, 304
White Zinc Paint 304
White's Wood Block Flooring .. 239
Whitewashing 275, 276
Whiting 276
Whitsom-Newton Stone.. 211
Wild Carr Stone 201
Willesden Canvas and Paper.. .. 307
Wind, Pressure of 153
Windmills .. ..340†
Window Frames 244
Windows and Frames 294
——— Proportion of, to Room .. 63
Winsley Ground Stone 190
Wire, Birmingham 154
—— Lathing 277
—— Netting, Galvanized 328
—— Sheep-netting 329
Wiring, Electric, Cost of 341
—— and Fittings, Electric .. 341
Wood Block Flooring .. 238, 239, 250
—— Casings 246
—— Columns, Strength of 23
—— Decay of.. 30
—— Girders, Strength of 50
——— with Wrought Iron Flitches 52
—— Joists, Table of 47
—— Lintels 64
—— Mosaic Floors, Brown's .. 238
—— Paving, Notes on 223
—— Pillars 81
—— Preservation of 84, 85
Wooden Roofs, Table of Scantlings 92
Work, Excavator's, Price per Cubic Yard 155
Writing 303
Wrought Iron 291
——— Casements 291
——— Cisterns 291
——— Girders, Strength of 53
——— Pavement Lights .. 291
——— Straps and Ties .. 291
——— Struts .. 111 to 112
——— Tubes .. .. 293†
——— Weight of.. 143

Y.

Yorkshire Stone .. 186 to 188, 201
York Stone Landings 160
——— Paving 160

Z.

PAGE

Zinc Balls 282
—— in Flats 299
—— Gauge of 154
—— Gutters 299
—— Malleable Sheet 299
—— Memoranda of 154
Zinc Nails 299
—— Pipes 299
—— Table of Thicknesses of .. 154
—— Tubing 299
—— Verandahs 299
—— Weight of a Square Foot .. 154
—— White 304
Zincworker 299

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
STAMFORD STREET AND CHARING CROSS.

J. TANN'S

"ANCHOR RELIANCE"

STEEL DOORS AND SAFES

FOR ALL PURPOSES.

LOCKS.

PRICE LISTS AND ESTIMATES FREE.

NEWGATE ST., E.C.

[To follow Index.

TRADE MARK. "ABYSSINIAN." GOLD MEDAL, HEALTH EXHIBITION. TRAD "NO

NORTON'S PATENT

"ABYSSINIAN" AND ARTES

TUBE WELLS AND PUMPS.

NORTON'S PATENT REGISTERING

TURNSTILES.

LE GRAND & SUTCLI

Hydraulic Engineers,

CONTRACTORS TO H.M. GOVERNMENT,

Magdala Works, BUNHILL ROW, LONDON

TELEGRAMS—"ABYSSINIAN, LONDON."

No 1675. CENTRE OUTLET. "WASH-DOWN."

ESTABLISHED 1790.

JAS. WOODWARD & ROW

SANITARY POTTERS,

SWADLINCOTE, near BURTON-ON-TR

SOLE MANUFACTURERS OF THE **"WASH OUT" CL** PATENT.

Many Patterns of "WASH DOWN" CLO

Specialities in Closets, Traps, Urinals, Lavatories and other Sanitary Fittings.

Price Lists and Full Particulars on application.

WINDOW BLIND

JOHN SOPER

20 Old Cavendish St., Oxford St., Londo

MANUFACTURER OF

EVERY DESCRIPTION OF WINDOW BLIN for Inside and Outside.

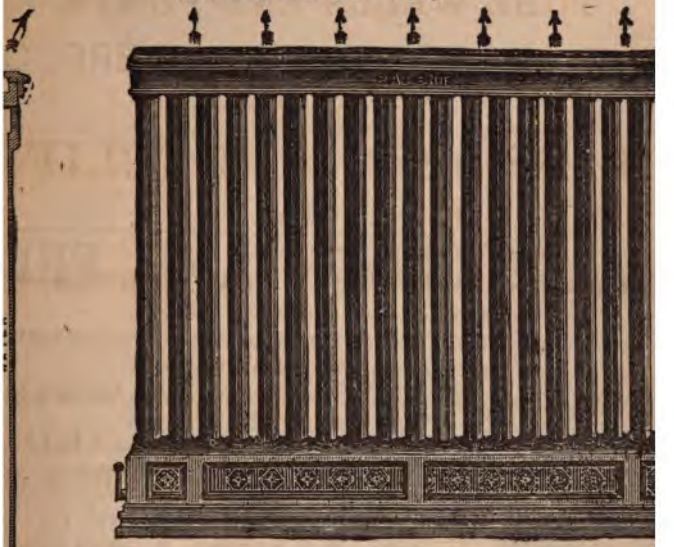
Inventor, Patentee, and Manufacturer of "The Lever-action P Venetian Blinds—the best article manufactured for the purp Venetian Blinds should be fitted with them.

THE TRADE SUPPLIED.

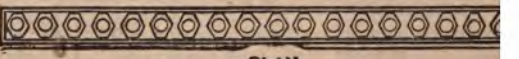
IE COALBROOKDALE CO., LIMITED

HYDRO-CALORIC RADIATOR AND INLET VENTILATOR

(HEAPS' PATENT).



ELEVATION.



PLAN.

For Warming on Low Pressure Hot Water S

PARTICULARS AND PRICES ON APPLICATION.

ION

DDRESS—

Works:—COALBROOKDALE, R.S.O., SHROPSHIRE.

Telegrams—"Darby, Coalbrookdale."

w Rooms:—Victoria Embankment, BLACKFRIARS, LONDON, E.

Telegrams—"Severndale, London."

PIERCE, WATTS & CO.,

FOREIGN TIMBER MERCHANTS AND IMPORTERS,

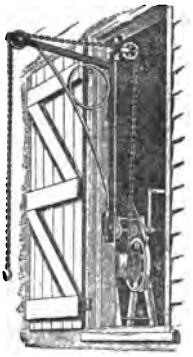
CANADA DOCK,

LIVERPOOL.

BRANCHES:
DOCK CHAMBERS, FLEETWOOD,
AND GARSTON.

BAIZE CLOTH AND FELT
AND ART SERGES,
FOR DOORS, CURTAINS, AND ALL DECORATIVE PURPOSES.
PATTERNS ON APPLICATION.
Special attention given to dyeing to Architect's specifications.

MITCHELL, INMAN & CO.,
40 CLOTH FAIR, WEST SMITHFIELD, E.C.



ATTERTON'S IMPROVED
JIB CRANES & CRABS.
Prices from £6.
WALL, WHIP, and OTHER DESIGNS.

Illustrated Price Lists on application to the Maker,

JOHN ATTERTON,
ENGINEER, HAVERHILL,
Also Maker of Builders' Improved 3-wheel Hand Trolleys, to carry from 2 to 10 cwt.
[SEND FOR PRICE LIST

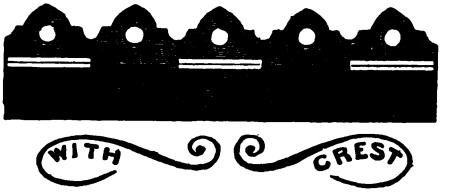
KELLOW'S

Patent Interlocking Slate Ridging.

THE MOST PERFECT RIDGING IN ANY MATERIAL UPON THE MARKET.

Interlocks into what is practically one solid piece.

No Screws required.



Easiest of all ridging to fix.

Handsome, Neat, Artistic, Durable.

IMPERVIOUS TO FROST. CHEAPEST IN THE END.

APPLY TO

MOSES KELLOW,

PARK SLATE QUARRIES,

PENRHYNDEUDRAETH, NORTH WALES.

BOOK OF DESIGNS & PRICES ON APPLICATION.

Telegraphic Address: CARTERS' POTTERY, POOLE.

ALEX. MACDONALD & Co., LTD.

(Formerly ALEX. MACDONALD, FIELD & CO.),

Aberdeen Granite Works, ABERDEEN,

And 373 EUSTON ROAD, LONDON, N.W.

Telegraphic Address:—"RUNIC," { ABERDEEN. LONDON.

Columns, Pilasters and all Building Work, in Red or Grey Granite, executed promptly, and at moderate rates.

ENGLISH AND FOREIGN GRANITES SUPPLIED.

COLOURED MARBLES FOR INTERNAL DECORATIONS.

Telegraphic Address: "HERRINGBONE, LONDON." Established 1830.

DAMMAN & WASHER & Co.

Offices and Showrooms:

LONDON: 72 Finsbury Pavement, E.C. (Near Liverpool St., Broad St. and Moorgate Stations.) **BRUSSELS: 69 Rue de la Clinique** *London Director:* MR. E. W. JENNINGS.

Manufacturers of all kinds of Plain and Ornamental

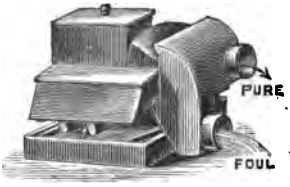
PARQUETRY & JOINERY,

Doors, Windows, Dadoes, Panelled Ceilings, Overmantels, Office Fittings, Staircases, Church Stalls, &c. &c.

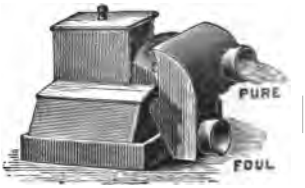
AWARDS: 80 DIPLOMAS OF HONOUR, GOLD MEDALS AND OTHER DISTINCTIONS.

No American Oak used. Designs, &c., on application. The Trade supplied.

THE RAIN-WATER SEPARATOR.



Prevents first rainfall passing into tank. It cants and stores water when the rain has washed roof.



RUNNING TO WASTE **£3 to £6.** RUNNING TO STORAGE

C. G. ROBERTS, HASLEMERE, SURREY.

Established 1854.

W. E. HARRISON,

THE STEEPLE JACK

FOR

Lightning Conductors and all High Structure Repairs.

"STEEPLE JACK" WORKS, SHEFFIELD.

REG. TELE. ADD.: "STEEPLE JACK, SHEFFIELD." TELEPHONE 561.

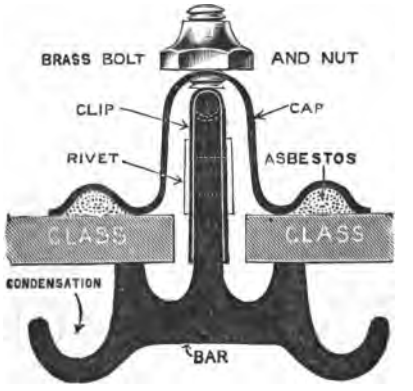
THE

HELLIWELL GLAZING.

NO PUTTY. NO PAINT.
GUARANTEED WATERTIGHT.
PATENT IMPROVED GLAZING BARS.

STEEL BARS SPECIALLY ENAMELLED TO PREVENT CORROSION.

ORDINARY SECTION to carry 6 ft. 6 in. without purlin.
MEDIUM „ „ 9 ft. „ „
STRONG „ „ 12 ft. „ „



CAPS IN EITHER COPPER, ZINC, OR LEAD.

ADOPTED BY ALL LEADING RAILWAY COMPANIES,
H.M. GOVERNMENT, SCHOOL BOARDS AND MUNICIPAL AUTHORITIES.
ADMIRABLY ADAPTED FOR ROOF GLAZING OF EVERY DESCRIPTION.

PATENTEES:—

HELLIWELL & CO., LIMITED,

WORKS: BRIGHOUSE, YORKSHIRE.

LONDON OFFICE: 9 VICTORIA STREET, WESTMINSTER, S.W.

P. G. Meek & Co.

BRASS ENGRAVERS

AND

SIGN & GLASS WRITERS.

DOOR & WINDOW PLATES,

WOOD & METAL LETTERS,

INCISED & GILT FACIAS, &c.

---

44 BLACKFRIARS ROAD,

LONDON, S.E.

By Royal
Her Majesty's Letters Patent.

ESTABLISHED A.D. 1774.

AUSTIN'S NEW IMPERIAL PATENT SUPERFINE FLAX LINE.

The above article is now being manufactured and sold in large quantities for Greenhouse Sashes, Public-house Shutters and other heavy work. The manufacturers would recommend it for its strength, and the large amount of wear in it, consequent on its peculiar manufacture.

AUSTIN'S IMPERIAL PATENT FLAX SASH AND BLIND LINES

(TWO PRIZE MEDALS AWARDED).

The manufacturers of the above articles particularly wish to draw the attention of the trade to their Imperial Patent Flax Sash Lines, of which they are now making eight qualities, all of which they can strongly recommend, as they have given unqualified satisfaction to the trade for now over One Hundred Years; and the Proprietors continue to give their personal attention to the manufacture of these goods.

AUSTIN'S IMPERIAL PATENT LOG AND HALYARD LINES

are now sold in large quantities, and are to a large extent superseding the old sorts. They also invite the particular attention of the trade to their

IMPERIAL PATENT BLIND LINES,

which are very superior to anything yet offered.

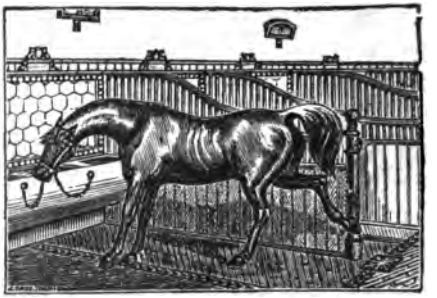
THEY CAN BE OBTAINED OF ALL ROPEMAKERS, IRONMONGERS, MERCHANTS, FACTORS AND WHOLESALE HOUSES IN TOWN AND COUNTRY.

N.B.—Please note that all our goods, as advertised above, are labelled, either inside or outside, with our Trade Mark—The "ANCHOR."

The St. Pancras Iron-Work Co.,

ST. PANCRAS ROAD, LONDON, N.W.

COACH
HOUSE
AND
HARNESS
ROOM
FITTINGS.



PATENT
PAVING.
DRAINAGE.
VENTILATION.
ETC.

PATENT SAFETY STABLE FITTINGS.

Catalogue on Application.

IRON
ROOFS.
BALCONIES.
VERANDAHS.

IRON
STAIRCASES,
STRAIGHT
AND
SPIRAL.

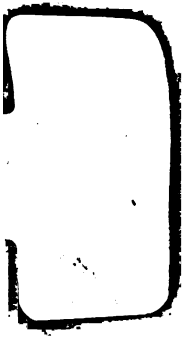
BRIDGES.
GATES.
RAILINGS.
DOORS.

WROUGHT
AND
CAST IRON-
WORK
IN
GENERAL

TELEFHONE No. 7519.

Telegraphic Address:—
"EQUITATION, LONDON."

THE NEW YORK PUBLIC LIBRARY
REFERENCE DEPARTMENT

This book is under no circumstances to be taken from the Building

Form 410